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ILLUSTRATION.

A Vision of the City of London, Constructed on the Plan left by Sir Christopher Wren.—Drawn and Engraved by Mr. Worthington G. Smith, under the Direction of Mr. Godwin 598, 599

CONTENTS.

London: as Arranged by Sir Christopher Wren 597
The Very "Great Metropolis" 597
Elementary Building Construction 599
Reminiscences of Folkestone 599
The Opposition to the Protection of Rivers 601
The Mamertine Prison: Rome 603
Coins: Medals 603
The Discoveries in the Trend 603
The Rateability of Oxford University Lands 604
Improvements at Bradford 604
Karrachee Breakwater 604
Disposal of Town Sewage 604
A New Street from Holborn to the Strand 604
The Roads and Pavements of London 604
On Building in Concrete 601
Libels upon Concrete Building 602
Tiverton Sanitary Affairs 602
Constant and Intermittent Water Supply 602
Apropos of Costume 602
The New Bank Premises in Peterborough 602
Question as to "Custom" in the Building Trade: Barker v. Cullum and Others 603
Charing-cross Approach to the Embankment 603
Charing-cross and the Embankment 603
Peter the Great's "Furniture" 603
At the Soirée 603
Discharge Without Notice: Watts v. Crokam 604
School Board Schools 604
Church-Building News 604
Hastings New Town Hall Competition 605
Railway Accidents in London 605
The Ventilation of Sewers 605
Threatened Strike in the London Building Trade 605
"The Grinding Money" Question 605
Wanted! The Metropolitan Building Act 605
The Gases from Cement Kilns 605
Books received: Tolhausen's Technological Dictionary (Sampson Low & Co.) 606
Miscellanea 606

London: as Arranged by Sir Christopher Wren.

IN desire of King Charles II., Sir Christopher Wren, in the year following the Great Fire, prepared a report with plan on the best mode of rebuilding the City. The plan is well known. In some of our earlier volumes we have commented on the advantages it offered, and in one published an engraved outline of it. Wren sought in his plan to avoid the deformity and inconveniences of the old town, by enlarging the streets and lanes, giving main thoroughfares north and south, and east and west, by placing all the churches in conspicuous positions, and insulating them; by forming the most public places into large piazzas, the centres of eight ways; by uniting the Halls of twelve chief companies into one regular square annexed to Guildhall; and by making a commodious quay on the whole bank of the river, from Blackfriars to the Tower.

In making the plan he arranged that the streets should be of three magnitudes; the principal, leading through the City, and one or two cross streets, to be at least 90 ft. wide, others 60 ft., and the lanes about 30 ft., excluding all narrow dark alleys without thoroughfares, as well as all courts. The Exchange was to stand free in the middle of a piazza, and be, as it were, the centre of the town, whence the 60 ft. streets, as so many rays, should proceed to all the principal parts of the City; the buildings to be contrived after the form of the Roman Forum, with double porticos. Many streets were to radiate to the bridge. The streets of the first and second magnitude were to be carried on as straight as possible, and to open into piazzas. On the banks of the Thames was to be formed a spacious and convenient quay, with some large docks. He proposed that the churches should be designed according to the best forms, for capacity and hearing, adorned with useful porticos, and with lofty towers and steeples in the greater parishes. All trades that use great fires, or yield noisome smells, were to be moved out of the town.

In placing the plan before the King, and the House of Commons, Wren himself thus explained it:—

"From that part of Fleet-street which remained unburnt, about St. Dunstan's Church, a straight street, 90 ft. wide, crosses the valley, passing by the south side of Ludgate Prison, and thence in a direct line ends gracefully in a piazza at Tower-hill; but before it descends into the valley where now the great sewer (Fleet-ditch) runs, about the once middle of Fleet-street, it opens into a round piazza, the centre of eight ways, where at one station are these views—first, straight forward quite through the City; second, obliquely towards the right hand to the beginning of the quay, that runs from Bridewell Dock to the Tower; third, obliquely on the left to Smithfield; fourth, straight on the right, to the Thames; fifth, straight on the left, to Hatton-street and Clerkenwell; sixth, straight backwards towards Temple-bar; seventh, obliquely on the right to the walls of the Temple; eighth, obliquely on the left to Curaitor's-alley.

Passing forward, we cross the valley, once sullied with an offensive sewer, now to be beautified with a useful canal, passable by as many bridges as streets that cross it. Leaving Ludgate Prison on the left side of the street (instead of which gate, was designed a triumphal arch to the founder of the new City, King Charles II.), this great street presently divides into another as large, which carries the eye and passage to the south front of the Exchange (which we leave as yet for a second journey), and before these two streets, spreading at acute angles, can be clear of one another, they form a triangular piazza, the basis of which is filled by the cathedral church of St. Paul. But leaving St. Paul's on the left, we proceed, as our first way led us, towards the Tower, the way being all along adorned with parochial churches.

We return again to Ludgate, and leaving St. Paul's on the right hand, pass the other great branch to the Royal Exchange, seated at the place where it was before, but free from buildings, in the middle of a piazza, included between two great streets: the one from Ludgate leading to the south front, and another from Holborn over the canal to Newgate, and thence straight to the north front of the Exchange."

The practicability of this whole scheme, without loss to any man, or infringement of any property, is said to have been demonstrated, and all material objections answered; the only—and, as it happened, insurmountable—difficulty remaining, was the averseness of great part of the citizens to alter their old properties, and to recede from building their houses on the old ground and foundations; as also the distrust in many, and unwillingness to give up their properties, though for a time only, into the hands of public trustees or commissioners, till they might be dispensed to them again with more advantage to themselves than otherwise was possible. A grand opportunity in consequence was lost of making the new city the most magnificent, as well as commodious for health and trade, of any existing.

More than three years ago,—that is, in March, 1872,—Mr. Edwin Chadwick, C.B., who was proposing to read a paper at the Society of Arts on what engineering art and architectural art, under the guidance of sanitary science, could do for the building of new cities and the rebuilding of old ones; and had arranged to re-introduce Sir Christopher Wren's plan for the rebuilding of the City, to show what his diagonal lines would have done for external ventilation, and what he would have done by excluding blind courts and alleys, and providing a better order of dwellings; suggested to us that a sort of bird's-eye view of the City, produced on Wren's lines, would form, if published in our journal, an interesting accompaniment to his lecture. The drawing was made and engraved very rapidly, in order to be ready for the occasion, but circumstances led to the postponement of the lecture, and from that time to this we have retained the engraved block. We follow out the original arrangement to some extent by publishing it in our present issue* in connexion with a report on the City thoroughfares, wherewith Mr. Chadwick has been mainly concerned, and portions of which we print on another page.

The author of the well-known "Critical Review of the Buildings of London," writing of this plan, says "Wren had planned a long and broad wharf or quay, where he designed to have ranged all the Halls that belong to the several companies of the city, with proper warehouses for merchants between, to vary the edifices, and make it at once one of the most beautiful and most useful ranges of structures in the world. But the hurry of rebuilding, and the disputes about property, prevented this glorious scheme from taking place." We do not find, in Wren's own report, confirmation of this statement as to the arrangement of the Halls on the quay, nevertheless we have followed it in the view we give. We will only add at present that Wren's plan is full of suggestiveness, both from a sanitary and an æsthetic point of view.

THE VERY "GREAT METROPOLIS."

IT is as difficult for the ordinary Londoner to tell where London commences and where it terminates as it is to point out the precise line of demarcation between the divers colours of the rainbow. The suburban townlets and hamlets blend so insensibly into the cities and liberties of the urban boroughs and bailiwicks, that one might as well attempt to define the particular point at which the fresh water gets to be salt at the mouth of some estuary as to say where the capital ends and the environs begin.

Moreover, the generality of Cockneys have hardly any clearer ideas concerning the extent of the huge metropolis in which they live than the Atlantic fishes have of the vastness of the ocean in which they swim. Indeed, even the best disciplined intellects can but form the same hazy concrete notion as to the collection of units which serve to make up large aggregate numbers as they never fail to entertain respecting the multiplicity of square yards or acres which go to compose inordinate dimensions in space. Does it give a person any real sense of the enormity of this enormous wilderness of bricks

* See p. 598.

and mortar which we style the British Capital to be told that its buildings cover an area of nearly 120 square miles?—that the houses huddled together upon it amount in round numbers to half a million—and that the great swarm of working bees frequenting the huge hive is made up of some three millions and a half of busy honey-seeking creatures? What mind can comprehend the *forty thousand millions!* of silicious shells of insects which the great microscopist Ehrenberg assures us are contained in every cubic inch of the fossil slate of Bilin? What brain is helped to compass the aqueous immensity of the sea by being informed that the total area of the several oceans amounts to not less than 145,000,000 of square miles of water? or that the capacious saline pond contains, altogether, dissolved in it as many as 6,441 *billions!* of tons of common salt? (*Ansted*).

The first and main difficulty in the way of forming a comprehensive conception of London in its integrity, is that there are as many different Londons as there are divers modes of dividing the current coin of the realm in Germany. And thalers, florins, and güldern—silver-groschens, kreutzers, and stivers, are not more perplexing to the traveller, nor the several thermometric scales of Fahrenheit, Centigrade, and Réaumur, more troublesome to the chemical student, than are the various metropolises which it has pleased the various official Boards to invent and prescribe. Not only has the metropolitan police a special metropolis; but the Registrar-General has another with a more circumscribed area, and widely-dissimilar boundaries. Then, again, the Post-office has its particular London, and the City Mission also a London of its own peculiar manufacture; and so on, until there are nearly the same number of diverse British capitals as there are "real original" Eaux de Cologne fabricated in the native town of the veritable Jean Maria Farina—and each, too, compounded in a wholly different manner.*

Is there, then, no Metropolis proper?—no definite palatinate which can be mapped out as the special county of Cockaigne?—no precise territory, hemmed in by a topographical ringfence as it were, to which the name of London, *in propriâ terrâ*, can be strictly applied? Or is the horizon which seems to gird the capital with a silver zone from the top of St. Paul's a mere illusion?—like the visionary atmospheric vault which appears to concentrate within its ever-varying bounds the very boundlessness of the ocean itself.

Let us see. But first let us take a cursory glance at the limits of "Police London," for this will serve to rest the eye for a while, instead of keeping it continually on the statistical strain.

Well, the police metropolis covers a circle whose circumference is very nearly a hundred miles in extent,—the radius from Charing-cross being just upon fifteen miles long. Hence, the entire domain watched over by the Metropolitan "Force" comprises, in round numbers, half a million statute acres, or exactly 688¾ square miles,—an extent of territory that is about one-tenth the size of the entire Principality of Wales, and very nearly twice the magnitude of the entire island of Madeira.

The extreme boundary of this same police metropolis includes, on the North, the parish of Cheshunt, in Herts, and South Mimms (near Enfield); on the South, Epsom, in Surrey; on the East, Dagenham and Crayford (near Dartford), in Kent; and on the West, Uxbridge and Staines, in Middlesex.

Such constitutes what is termed the "Metropolitan Police District,"—the entire district being divided into an "Inner" and "Outer" one; and the smaller, or inner district, having hardly one-seventh the area of the outer, since it comprises somewhat less than 100 square miles. Indeed, the Inner Police District, as it is called, is nearly equal to that included within the tables of the Registrar General,—the former being rather more than 90 square miles, and the latter not quite 120 in extent.

Now this same "Registration District" must be regarded as constituting the metropolis proper, or *London as regulated by law*. For, in the year 1852, it was found necessary to pass a special Act (to wit, the Burial Act, 15 & 16 Vict., cap. 85), in order to let Londoners know how far London extends into the country,—as well as to define the exact limits of the "Great Metropolis," according to Act of Parliament. This, however, was a feat of legislation very much of a piece with that performed by the renowned progress-hating King Canute, at the beginning of the year 1000; since it is quite as absurd for would-be rulers to say, "Thus far shalt thou go, and no farther," to the metropolitan bricks and mortar, as to the waves of the ocean. Indeed, the celebrated bean-stalk planted by the aspiring Jack in the nursery story was hardly more rapid in its growth than has been that of this giant mushroom of a British capital of ours. At the commencement of the year 1600 the legal limits of London, "within and without the walls," were but little better than two square miles in extent, or hardly bigger than the tiny island of Gibraltar; whereas, in the next century, the metropolis, according to law, had swollen to rather more than thirty square miles. Then, at the beginning of the present century, the area was further enlarged to just upon fifty square miles; after which, in 1837, it was again increased to sixty odd square miles; and latterly, in 1852, as we have said, it was still further extended by special Act of Parliament to nearly double the size it was fifteen years previously; so that it now has a superficies of exactly 117¾ square miles. And who can say but that, at its recent rate of expansion, the huge brick-and-mortar fungus may not by the end of the present century spread into a civic toadstool, of even double its present dimensions?

Nevertheless, in the Burial Act it is expressly laid down that the term "metropolis" is to be understood to mean and include "the cities and liberties of London and Westminster, the borough of Southwark, and the parishes, precincts, townships, and places," thereinafter duly specified and recorded. And, accordingly, we find that London by law is made to extend into Middlesex as far north as Hampstead, and into Surrey as far south as Tooting; whilst it stretches into Kent as far east as Plumstead, and thence back again into Middlesex and Surrey as far west as Hammersmith on one side of the Thames, and Barnes on the other.

These, then, are the extreme legal limits of the metropolis proper. From east to west it ranges on the Middlesex side of the river almost from Blackwall to Brentford, and on the Kent and Surrey side from Woolwich to Wimbledon; whilst north and south it runs very nearly from Crouch End to Clapham. Moreover, so directly connected are these diametrically-opposite points of the compass of the capital that there is one continuous street of houses joining the several metropolitan polar regions, and measuring about fourteen miles in length from Chiswick to Stratford, and about thirteen miles from Highgate to Dulwich. So that this same inner circle of urban London (as contradistinguished from the larger outer disc of the suburban metropolis, guarded by the police of the capital) is found to have a radius of just about 8¾ miles, whilst its circumference is within a fraction fifty-five miles in extent; and thus the one gigantic town is made to cover a territory which is very nearly as large as that of the *entire county of Rutland!*

Now this immense monster of a city, which is as big as a county, country-people delight to call ironically the "little village." But though we may gain some notion of its size from learning that the ground on which London stands is just about as extensive as the whole area of the Isle of Wight,—still what can impress us with a sense of the seemingly-countless crowd of houses which are packed within its boundaries almost as close as figs in a "drum"? A coral reef hardly consists of a more solid mass of habitable walls; nor do the ant-hills of India teem with a denser or busier swarm of living creatures. Were it possible to count the grains of sand in the Sahara, the infinite host of numerals representing the sum of the collective particles would no more give one an idea of the Great Desert, than the fact that the enormous habitable honeycomb of this huge hive of a town is made up of some half a million of distinct domiciliary cells all walled together in the close contiguity of geometrical compactness.

Such numerical statements, however, are the mere sawdust of statistics,—the pedantic foppery of figures. How can the mind possibly comprehend half a million in one simple thought? It is as difficult to grasp large numbers as it is to clutch water.

How, then, can we conjure up an adequate conception of the mighty multitude of buildings with which this bricken county of a capital is covered? Well, if we have but a misty idea of mass in its integrity, at least we can arrive at a clearer sense of length in its continuity. Spin an ounce of platinum, which would hardly fill a nutshell in the lump, into a thousand miles of wire as fine as a silkworm's thread, and the wondrous extent of the fibre will give one a more or less vivid notion of the original bulk of the metal. Now, half a million houses having an average frontage of five yards each would form an unbroken line of buildings which would be just upon 1,300 miles long; and 1,300 miles of dwellings would be nearly sufficient to form one continuous row right round the entire island of Great Britain, from John o'Groats to the Land's End, and from the Land's End to the North Foreland, and from the North Foreland back again to John o'Groats. Or, what is more striking still, such a line of buildings would be more than enough to make one long street stretching right across Scotland, England, France, and Switzerland, from Dunnet Head in Caithness, to the banks of the Mediterranean.

If, then, such be the mere length of the aggregate houses in London, it may be readily conceived that the streets of the monster metropolis which, on looking at the map, seem to be a perfect maze of highways and byways,—a closely knitted network of thoroughfares,—should be some thousands in number: and accordingly we find that there are upwards of 10,500 different streets, roads, lanes, gardens, and parks; squares, ovals, polygons, crescents, circuses, and terraces; villas, buildings, rows, and places; particularised in that voluminous civic cyclopædia, the "London Post Office Directory." Many of these thoroughfares, too, are of no inconsiderable dimensions. The New-road, for instance (exclusive of its City appendage) is very nearly three miles long; Oxford-street, more than a mile and a quarter; and Regent-street, from Langham Church to Carlton-terrace within a few yards of a mile in length; whilst the two great lines of thoroughfares running parallel to the river,—the one extending from Bayswater along Oxford-street, Holborn, Cheapside, Cornhill, and Whitechapel, to Mile-end, and which is really but one continuous street with different names; and the other stretching from Kensington, along Knightsbridge, Piccadilly, the Haymarket, Pall-mall East, the Strand, Fleet-street, Cannon-street, Tower-street, and so on by Ratcliffe-highway to the West-India Docks, are each, from one end to the other, just upon ten miles in length.

Indeed, the gross extent of the London streets, small as well as great, is almost incredible; for by a return made by the police as far back as the year 1850, the aggregate length of the metropolitan thoroughfares, in the "inner" police district alone, amounted to not less than 1,750 miles; while those within the boundaries of the "Registration District," or metropolis proper, made up as many as 1,820 miles. In 1861, however, they had increased to 2,100 miles; whilst in 1871 these same collective thoroughfares of London as regulated by law had become extended to 2,500 miles. So that not only are they now a third of the earth's diameter; but would, if stretched into one long line, just about *span the Atlantic*, and reach from Liverpool to New York!

But prodigious as this vast amount of roadway may seem, it dwindles down into the mere dimensions of a rope-walk in comparison with the total length of streets patrolled by the Metropolitan Police; for by a recent return which has been specially prepared for us by the kindness of Colonel Henderson, we find that the aggregate extent of the thoroughfares included within the *entire* Police District amounts to not less than 6,612 miles, or more than one-fourth of the earth's circumference! Hence, it would appear that the roadways of this same Police District, which were hardly more than 3,500 miles long in the year 1850, have been nearly doubled in length within the last quarter of a century.

* "It is a peculiarity of the administration of this country," says the Registrar-General on the Census Returns for 1871, "that nearly every Public Authority divides the country differently, and with little or no reference to other divisions. Each authority appears to be unacquainted with the existence, or at least with the work, of the others. The Metropolis is an example. It consists of parts of three counties. The city of London stands on 668 acres (1·075 square mile) in its centre. The London within the Tables of Mortality differs from the London within the limits of the Local Management Act; and both differ from the London of the Central Criminal Court, which also differs from the London of the Metropolitan Police; while the London of the Metropolitan Parliamentary Boroughs is unique. Then the subordinate divisions of these several Londons seldom agree .... Moreover, besides these Londons there is the Diocese of London; and other Londons have been constituted by the Post-Office and by other Departments—each having its own preconceptions and administrative views, without any reference to the order and harmony of the whole. Each London, too, has generally its special administrative body or executive officers."

And who can wonder? seeing that the same return informs us that between January 1st, 1864, and December 31st, 1873, there were as many as 133,708 houses built within the Metropolitan Police District, comprising 27 new squares and 2,952 new streets! So that, as this is just about one-third of the gross number of houses there were in all London at the time of taking the last census, it follows that at such a rate of expansion the monster Metropolis,—monstrous as its present dimensions may appear,—will assuredly be twice the size it now is by the end of the present century.

ELEMENTARY BUILDING CONSTRUCTION.

THIS well got-up anonymous treatise* is the first part of a work to be completed in three parts, and to form a text-book "to assist students in preparing for the examinations in building construction, held annually under the direction of the Science and Art Department at South Kensington," with the authority of which Department it is therefore, we presume, issued. Something of the sort was very much needed; for though of course there are able and complete treatises, on a larger scale, in regard to all the important branches of building construction, an exhaustive study of them can hardly be expected from a student, and a book distilling the substance of larger works, and putting the outlines of constructional science together in a small compass, is a very important aid to students, who may afterwards supplement from larger treatises their study of the particular branch of construction to which circumstances or inclination most attract them.

The present volume is intended to fit the student for examination in the first or elementary course. Part II. will contain further instruction in the same subjects, and also include those mentioned in the Syllabus of the Science and Art Department for the second stage, or "advanced course"; and Part III. will contain instructions regarding "the nature of stresses to which the different parts of simple structures are subjected, the nature, application, and characteristics of the materials used in buildings, together with notes on foundations, timbering, excavations, scaffolding, travellers, &c." So far as regards these practical subjects, the third part is intended to qualify for the "Honours" Examination of the Science and Art Department, but, as it is pointed out, "the art of designing buildings from given conditions, and the problems involved in the theory of construction, must be studied in works specially devoted to those subjects." How far "examination" can be conducted at all in regard to the former of these subjects is a question: what to one judge appears evidence of a knowledge of artistic design, to another will not; and certainly what pleases the South Kensington authorities in design has not always pleased the rest of the world.

To return, however, to our immediate subject. Part I. goes pretty minutely and exactly through the details of the various branches of work included in ordinary house-building operations, under the headings of "Walling and Arches," "Brickwork," "Masonry," "Carpentry," "Floors," "Roofs" (timber and iron), "Slating," "Plumber's Work," and "Joinery." The brickwork section is much better and less empirical than the treatise by a practical bricklayer which we noticed a little while since (in Weale's series). The intricacies of bonding in different positions, are very fully illustrated, sections of each style of bond being given through its strongest and its weakest parts, calling attention to deficiencies of bond which the superficial examination of the brickwork hardly suggests to the student. The writer leans, correctly, in favour of the so-called "English bond" which has been so long thrust out of sight by the no more rightly-named Flemish bond, weaker in almost every way. The mysteries of angle bond and "king closers" and "queen closers" are here very fully illustrated, and the student may arrive at the conclusion that the apparently simple process of laying bricks together to make a wall is really one involving a considerable amount of calculation. Wholesome warnings are given, at the same time, against the lapses which the British workman is liable to: for instance, in gauged arches, bricklayers frequently "carefully rub only the portion of the joint near the face, cutting the back part right away, so that the arch does not bear equally, except just on the front edges of the bricks. This leads to the arch bulging forward, or to bricks dropping out of it altogether." It is an instance of the value of general education in regard to special trades that, although it is perfectly true that a practical working at the materials gives a knowledge of them in one sense that nothing else will give, yet the uneducated operative who has been all his life handling bricks, or stone, or wood, will commit the most utter absurdities in putting them together, from mere habit and want of reflection; and that such cautions are by no means superfluous all who have dealt with workmen are aware. It is in regard to the relation of construction to architectural expression that we generally find treatises of this kind deficient. It is vexatious to see, even as a casual illustration, such a representation of the most wretched style of regulation street house, as in fig. 4, and to read that "the plinth is a projecting base to the wall, intended to give an appearance of stability, *and thus form an ornament.*" The plinth is a matter of real stability, and if it were not it would give no appearance of stability; and as to its forming "an ornament," we only wish that word were struck out of the dictionary, for the misuse made of it in such books as this, and the false idea which it conveys as to the nature and process of architectural design. The same elaborate design is again referred to (p. 51), with an explanation that the corbels under the window-sills are also "only for ornament."

The masonry section illustrates usefully, among other things, various ways of building with rough stones under the general head of "Rubble," but the remark that "the higher the class of masonry, the more regular are the stones, and the more easily are they built," may lead to misconception, and it really depends on whether we choose to consider that the highest class of masonry, or not. The writer had better look at some of the towers of Suffolk churches (Lavenham, for instance), built of broken flints, and say whether that is not a "high class of masonry." The use of metal in cramping masonry is made of rather too much importance; there are situations where it cannot very well be dispensed with, but these are also where it can easily be got at for replacement when rusted and decayed; but, in general, to put metal in the interior of a wall is to plant a destructive agent, as it were, in the heart of the citadel; paintings and galvanisings cannot be depended upon for long.

"Carpentry" commences with a very full description and illustration of the various forms of joints in timber work on a large scale, prominence being given to those methods of joining in which iron is dispensed with, or which at least depend most upon the fitting and cutting of the wood; though the useful and neat old "trenail" fastener scarcely receives sufficient notice. We should look with some little doubt upon the assertion that "square holes and pins are better than round ones, as they are less liable to split the wood." Are there statistics to show this? The supposition would be that the square hole was the most liable to do so in the process of forming it; moreover, the square pin, tightly fitted in a square hole, is, in case of any settlement or displacement of one of the timbers which it holds together, subjected to a cross strain, with a very heavy leverage tending to tear or twist it,—a danger which does not affect the circular pin in the least. The circular joint is (p. 72), to our thinking, a little too hastily dismissed, considering the high authority of Tredgold in its favour (for large work), and the unquestionable fact that it is less liable to "opening" at one point from disturbance or settlement than the angular joint. It is no doubt more troublesome to make. A contradiction between theory and practice is signalised in the naïve admission (p. 77) that the operation of "draw-boring," — drawing up the timber to its utmost stretch with an iron pin before inserting the oak pin,—"is condemned by most writers, as it produces a constant and objectionable strain upon the pin and tenon; *but it is nearly always resorted to in practice.*"

In the chapter on "Floors," the writer does not seem to know his own mind quite on one point, as he enumerates among the disadvantages of single floors, that "the joists bear equally on all parts of the walls, and thus the jars upon the floors are communicated to the wall even at its weak points"; while on the next page we read that double floors "are in many ways a complicated and bad form of construction, that the ridging joints are burdens on the binding joints" (what else are they intended to be?), "and these in their turn transfer the whole weight of the floor and its load to a few points on the wall, instead of distributing the pressure." This is rather an absurd contradiction to find on two opposite pages. In practice, the question is only of importance (as to stability) when the weight to be carried by the floor is considerable in proportion to its area and to the strength of the walls; and in that case there cannot be a shadow of doubt that the double floor is the more scientific construction; always supposing that the binding joists are really brought on to the most solid parts of the walls. The adoption of some kind of corbelling is rightly recommended in preference to the almost universal practice, in ordinary structures, of building the joists into the walls, by which the latter are not only weakened in the first instance, but the tremors and sounds of each floor much more intimately connected with the wall and (consequently) with each other. "Pugging" should not have been mentioned without a warning against the danger of rot which it entails by hindering circulation of air. We have known cases in which the whole floors of a large building had rotted away to a state of absolute insecurity from this cause, and might have actually come down before any external sign of the state of things was manifest.

The principal forms of wooden and iron roof construction are adequately illustrated, and the chapters on slating and plumber's work give all the information necessary to the student. The unscientific and unsafe method of nailing slates near the top ought not to have been mentioned without its decided inferiority to the other practice of nailing at or near the middle being more distinctly pointed out. It is curious and instructive, in the section of the gutter and cornice, p. 161, to note the complicated and at the same time defective arrangements entailed by the useless blocking course, with the lead gutter low next the slates, and raised much higher on the "blocking" side; really a contrivance for overflowing the water under the slates in heavy rain. The really honest and architectural use of the cornice as a hollowed stone gutter lined with lead, is, on the other hand, treated as a mistake, and there are practical difficulties in working the lead; it would be quite possible to succeed with cement as a lining. At any rate, the stone gutter, whether treated with lead or otherwise, is a common-sense affair, and is at the worst a far more scientific and architectural treatment than the "blocking" gutter. The section on "Joinery" contains useful and pretty full illustrations of the methods of putting together door and window frames. There are one or two points open to comment: for instance, the counter-sinking under the bottom rail of a sash, so as to lap over the throating of the sill, is only given as an optional method "sometimes" employed; it is, or ought to be, done in all work that claims to be good; the section of bottom rail and sill shown as the normal one in fig. 317, would be both a wet and a windy one, if exposed to any driving rain. The old prejudice against casement windows is kept up here also; they are not "difficult to render watertight" if you go the proper way about it. The joint on figure 324 will not do it, certainly; what it wants is a vertical shoot or groove to let any water run down that is driven in; unless the water has that channel of escape, of course it will be forced by a strong wind round the joint sooner or later. The paraphernalia of boxing and glueing, and ropes and pulleys, of the old sash-window, are a much more serious drawback than anything connected with the casement-window; giving rise, as they do, to shaking and rattling, and to undesirable hollows backed up with rubbish, leaving a channel for draughts to find their way through, and a harbour for rats and mice, and affording opportunities generally for gimcrack joinery. The necessity for the weights is done away with by one or two recent inventions by which the sashes can be worked much more conveniently (a modification of one of which, we are glad to observe, is being applied to railway carriage windows, instead of the time-honoured strap and button), and between these and casement-windows, the sash-cord, pulley, and weights, with all its bandbox accompaniments, ought to be doomed.

In spite, however, of some old-fashionedness of the kind we have touched upon, this is a very useful little book, and the whole series, when

* Notes on Building Construction, arranged to meet the Requirements of the Syllabus of the Science and Art Department of the Committee of Council on Education, South Kensington. Part I.: First Stage or Elementary Course. Rivingtons: London, Oxford, and Cambridge.

published, will be a great boon to young students in the profession, and teach them some of the things which their masters, under the present pupilage system, very seldom do teach them.

REMINISCENCES OF FOLKESTONE.

THE visitor approaching the town from the railway station would little imagine Folkestone to be the beautiful place it is found to be on more extended acquaintance. First impressions from a look at the old town as we walk down the hill are pleasant as one after another prominent objects on the distant rising ground, spires, and public buildings, come into view. But as we advance along new thoroughfares towards the old harbour, past unfinished houses, and shops closed, with shutters up, and draped in dust and cobwebs, seemingly an air of settled gloom depresses the street. The fisherman has lost for the time his wonted blitheness as he saunters along with hands buried deep in the pockets of his capacious nether garment, in the midst of his day-dreams; and the smoke idly rises from his short pipe in slow whiffs, as if he too felt the dulness. A glance to the left at the most opprobrious barn-like church imaginable, heightens the disfavour conceived as we ramble along. Like its near neighbour, Dover, the history of Folkestone, or Folcestane, is an old one. In fact, it became in early times associated with other places in contributing as "limbs" towards the national navy, which it was the duty of the cinque ports at one period to entirely furnish and man. Not much historical knowledge has descended to us of the earliest days of the locality, but the town appears to have existed during the Roman occupancy, as a watch tower and beacon were erected on the cliffs for guidance of the imperial ships; whilst the fragments of pottery and urns found just below the land surface,—some of them during the last few weeks,—with many other relics and remains brought to light in former days, point to its original importance; and the traces of field-works lying on the high downs just outside the borough indicate a military station of some note. There are few extensive ruins full of antiquarian lore to delight the reflective mind, although once there were well-known ecclesiastical establishments, of which now remain but few traces. About the year 640, St. Eanswith, a daughter of Eadbald, a Saxon king, or Thane of Kent, after her father's conversion to the new faith, founded a nunnery,—one of the very earliest known,—whose site is supposed to be not far from the parish church, but more to seaward, of whom many legends were made known far and wide, of miraculous things, as was customary in those times; amongst others, the feat of providing water for the nuns, which she caused to ascend the cliff from the low land below, but which we moderners are inclined to think was more probably accelerated by hydrostatic pressure beyond than by the spiritual aid of the Saint.

This place, after a century or two, was destroyed by the Danes,—those remorseless ravagers of church property, during one of their raids upon this coast. After lying in ruins for a long period another religious structure was built upon its ground, with part of the old materials, by De Munville, soon after the conquest, who founded a priory; but this, too, did not enjoy a long existence, for within half a century, from the wasting away of the foreshore and cliffs by encroachment of the sea, it was soon destroyed. Somewhat later on a new house was given in lieu to the monks by Sir William de Averanches, Lord of the Manor in the twelfth century. It is now only a few years ago since the final portions of the monastery, which was restored in the third Edward's reign by Sir John de Segrave, were improved away during some municipal alterations by the corporate body. As an instance of the antiquity of the custom of granting pensions on retirement from office, it may interest the Civil Service and others to state here that Thomas, the last Prior of Folkestone, was granted an annuity by Henry VIII. on abolition of his post, at the general dissolution, which amounted to about a fourth of the net revenue. Although not often referred to now-a-days, it was a general thing to grant retiring allowances to the chief officials of the disestablished monastic institutions, probably met by fixed charges upon those to whom the lands and privileges were given. When the grand Armada attempted its descent upon England, great preparations were made by the people here to resist the threatened attack. A place of *rendezvous* from which the present street of that name probably originates, was appointed where the town and country folk were put into training and drilled; guns were mounted, and ammunition laid in; whilst the sailors and fishermen manned their five-and-twenty ships, with which they performed glorious deeds under Howard and Blake.

Dark days, however, were in store for the Folkestonians, for their town dwindled away as trade fled, and storms destroyed the feeble protections to the harbour and landing-places. Notwithstanding repeated appeals to the country for aid, and the expenditure of much capital upon the works, no advancement was made until the era of the South-Eastern Railway in 1843, when the place leaped with new-born vigour from its dormancy into the broad wakefulness of commercial energy, and now thrives under the advantages of one of the great highways into the kingdom, combined with the pleasures of a charming sea-side sanitarium. The construction of valuable harbour works and piers gives free ingress and egress for the hundred thousand passengers annually crossing the Channel from this port, conveyed by the fine fleet of swift steamers owned by the Railway Company, and to the large amount of commerce thus attracted, the present prosperity is undoubtedly in a great measure due.

A few years since, in erecting a new low-water pier, in connexion with the railway, which was extended to the east side of the south quay, so that Continental passengers could be transferred direct to the vessels, a useful, if novel, idea was adopted in its formation by the engineer in utilising the disused permanent-way metals of the South-Eastern system, of which the pier is primarily built. Abundant accommodation is provided for the travellers who sojourn here, by the many excellent and well-appointed hotels and inns,—some in the quaint old streets, streets that seem as if they were formed before the era of vehicles, from their narrowness, now crowded with well-filled shops, where the luxuries and necessaries of life are temptingly displayed to the passer-by. Some are upon the beach or adjacent thereto, handy for rail and boat; whilst within convenient distance are palatial bath-houses, fitted with every appliance meeting the requirements of the invalid or timid, combined with reading-rooms, amusements, and lounges; and on the beach the more robust and the swimmer will find good bathing-ground and capacious machines.

The public buildings, from the hilly nature of the position, stand out conspicuously to view; amongst them are several well-built churches, belonging to various denominations, the work of a local architect, who also designed the prominent and pleasing bathing establishment, on the shore, near the Lees. The most noted, however, of all is the picturesque old parish church, built upon the cliff overhanging the sea-coast. The earliest part of it dates back to the twelfth century. Its site, however, had been a place of worship and sepulchre for at least 500 years before, and quantities of human bones and remnants of implements of warfare are generally found on every disturbance of the surface in its vicinity. Leland, contemporary with Henry VIII., refers to the fact, in his day, of considerable discoveries of human remains hereabout. During recent years various restorations have been made to the church, adding to the comfort and convenience of the worshippers, although detracting from the quaint appearance of the interior. Numerous objects of interest,—tombs, monuments, tablets, and brasses may be found within relating to local magnates. Quite lately a stained-glass window has been furnished to the west end of the church, in memory of the physician, Dr. William Harvey, of world-wide renown, who was born here A.D. 1578, the revolutioniser of medical science by his discovery of the circulatory action of the blood.

The south side of the town is clearly the "west end,"—that is, it is the abode of wealth and fashion. On the high plateau above the cliffs beyond the old church has sprung up within recent years quite a new town of good streets and roads, containing elegant mansions and villas,—not stuffy, poky, Barking-like structures, but substantial Belgravian residences. Some of these, built on the Lees, command magnificent sea and inland views. To the front, as the sun shines brightly, may be seen fleets of ships transporting the commerce of the world as they sail gaily along the Channel up or down; while the background is filled by the outline of the French coast, looming in the distance dark and sombre, or light and bright, as the sun strikes down his rays, or they are absorbed by fleeting clouds. In the rear, rise up the rolling downs of chalk hills, tinged in rich golden ruddy hues, and we trace the odour of flowers and the sweet scent of new-mown hay, borne by the soft air flowing from the land. If the wind blows gently off the water carrying forth in his wings minute traces of saline matters, we feel its invigorating effects. Whether this may be due in some degree to the more entire absence of effete matters in such air, our philosophy has not yet divined; suffice it that the most subtle tests in chemistry have not revealed the nature of that active principle pervading the balmy shore breeze, so readily traceable by the nerves of the delicate nostrils, and expressively if commonly called "freshness."

It is a healthy sign of the times, of the advancement made in recent years by the general public in seeking a knowledge of sanitary affairs, when a member of Parliament rises in his place in the House and refers to the shortcomings of local authorities and the lax administration of laws relating to health; a proceeding attended with immense benefit which we should like to see recur now and then, for there is occasion in far too many of our urban and country places, where the great thing as to sanitary reformation seems to be how not to do it. When Lord Robert Montagu startled the country by his tirade in St. Stephen's upon the slums of Folkestone, good no doubt resulted, although the picture was said to be overdrawn and the statistics misunderstood. It woke up the authorities to a sense of the duties and responsibilities attending the office of sanitary administrators and guardians of the public health. In a town enjoying repute as a healthy, pleasant seaside resort, possessed of natural attractions in abundance aided by art, the utmost heed ought at all times to be taken that its fair name is not tarnished by blemished spots in out-of-the-way and half-hidden places. Inasmuch as the strength of a structure would be prudently adjudged by the practised builder in estimating it as a whole, not by that of its more imposing and stronger, but rather by that of its weakest parts; so would the sanitary reformer base opinions upon the state a town presented to his view by examination of the minutiæ of administration—as the appearance of courts and alleys, back streets and yards, the perfection of scavenging arrangements and rigidity of inspection; the quality of water supply at its source and as consumed, with an eye to the various appliances; on the mode and rapidity of conveyance of drainage water away from the houses and town and its final disposal; the state of the sewers and drains if clean or foul; the cleanness of the air breathed, and the numerous details necessary to be known in a sanitary inspection, which to the general public are perhaps out of sight and mind;—and less to the fine appearance of broad streets and to the magnitude of the buildings or their splendour. If in answer to these various points our investigation were not always quite satisfactory, we still affirm that the town is to be congratulated on its fair sanitary condition as a whole; indeed, we do not hesitate to place it high on the list of well-managed boroughs. There was, however, an evident want of thought in the noisy condemnation and strictures passed upon Lord Robert Montagu in public meeting recently held; for as the honourable member's outspoken words did them no harm, but ultimate good, so did the splutterings of the assembly and wholesale censure upon the critic damage their cause. The town whose municipal arrangements are good need not fear adverse criticism. If inquiry demonstrates that the excellence is not so perfect as was preconceived, the town may still gain.

The sewerage system is that of stoneware glazed pipes and culverts, with generally good gradients, conveying the sewage and rainfall by gravitation into the sea by the east cliff some distance away from the town. The sewers in the upper roads and districts are well ventilated through trapped gullies furnished with charcoal trays. The "closets" are in many instances ventilated from the soil-pipes, and the house-drains are cut off from direct aërial connexion with the street sewer. To the lower parts of the town in the old places by the harbour, and in the flat and smaller streets, more ventilation ought certainly to be given in the sewers and closets as early as possible, for in these parts there is a redundancy of foul air penetrating the houses that is very undesirable. Considering that the higher portions of the town's system are well ventilated, it seems singular that the foul air should not be carried there, but no doubt these lower sewers are often tide-locked and the air

cannot descend the branches to flow up the mains; whilst the foulness is increased by the destructive action of salt water on raw sewage, whereby more gas is generated than ordinarily. Hence provision is required for carrying it off more certainly and rapidly, and not into but away from dwellings. In a few houses by Harbour-street and the Strade, the nauseating odour of sewer air was found peculiarly powerful even for this kind of matter. Certain parts of the Strade, Radnor-street, Dover-street, Mill-bay, and the Narrows are confined in space and require some attention; there is nothing radically wrong about their condition, but the scavenging arrangements demand constant attention. Fishy offals, somewhat plentiful here and there, are subject to become nuisances if not speedily removed. Ill-paved court-yards demand application of the water-hose occasionally to scour them, and a sprinkling of disinfectant; although the fresh sea air is all-powerful as nature's destroyer of polluted air, these close places are not easily penetrated by it, and the atmosphere about them stagnates. In the older neighbourhoods indicated it would seem desirable to cut off the sink slop-pipes from the drains by delivery upon a trapped grate or into a gutter on the exterior to prevent ingress of sewer air when the sink grid is removed, a common habit by the way, and practice not by any means confined to Folkestone. Fortunately, the town possesses few of those pernicious shallow yard wells and pumps; nor did we observe many old-fashioned privy and slop cesspits still so commonly used in certain towns in Kent,—indeed, so prevalent in districts we know of, and may possibly refer to hereafter, that every house possesses at least one of these abominations either at the front or rear within a few feet of the walls, from which evil putrescible gases and odours readily permeate to the interior.

The glazed stoneware pans mostly used in the closets of small house property were found clean and well kept; they should, however, be ventilated. The system is unquestionably in advance of the old necessaries, yet might be improved greatly by a judiciously arranged water-supply, which they now lack. The principle is not a good one that calls upon the numerous occupiers of small tenements to flush these pans, for that which ought to be everybody's business is really performed by none, except in periods of panic and alarm, and under extraordinary inspection. It is not enough that the garbage and ashes be removed by the dustmen from the bins periodically, but the yards might be swept and scoured at very little additional public expense. Such localities of which Millbay and the Narrows are specimens, being beyond the public gaze, are apt to enact towards the whole community the part which the lucifer-match has performed towards the corn-rick, and in originating grand conflagrations as foci of possible contagion: hence it would be sound financial policy to provide for their maintenance in good sanitary condition at a little cost, which need not be burdensome, and under thorough inspection. The thoroughfares in this town are well tended, and formed with good sound materials. As pavement, concrete slabs are extensively used, prepared of small clean-washed gravel and Portland cement, which, thoroughly mixed and made with first-class articles, the chief ingredient consisting of well-washed gravel having clean surfaces and sharp angles, perfectly free from vegetable and clayey matters, furnish durable and economical paths. It is singular that, in so few instances, seaport towns and watering-places, possessing abundance of saline water, easily procurable and at nominal cost, employ it in allaying dust on macadamised roads, for which application it is much superior to the more expensive and commonly-served fresh water from the town service. As the water evaporates from the ground surface, little saline crystals form nuclei around which particles of dust are attracted by the hygroscopic nature of the salts, thus acquiring sufficient volume to resist the carrying action of every puff of wind. A few passages of the water-cart distributing sea-water along a road suffice for a length of time; and it is by no means necessary, or even advisable, to keep up a continuous application, as is usually made with ordinary water.

Like many Kentish towns built upon cretaceous formations, Folkestone is provided with a pure and wholesome water derived from wells and springs flowing from the chalk and greensand rocks at the base of Cæsar's-hill, and distant some two miles or so from the borough, under the management of a public company. The waters issue from the springs, and are pumped from the wells into open reservoirs, of which there are two with a capacity of 7½ millions of gallons.

From the service-reservoir at Cherry-gardens, the water is delivered to the inhabitants intermittently, which, at the time of our visit, was at the almost prohibitory rate of one hour per day. These waters, as they proceed from the springs or wells, are of very pure and wholesome quality, containing mere traces of organic matter; but of unusual hardness, which is provoking when performing ablutions, as proved by successive generations of visitors at hotels and lodging-houses vainly endeavouring to realise a lather from the fragments of air-baked yellow soap furnished in the lavatories.

It is well known that moderately soft water, such as flowing rivers, gradually lose the organic matter with which they may be more or less tainted, however slow the process; but Dr. Frankland has demonstrated clearly that hard spring-water ought never to be exposed to sunlight, as it rapidly deteriorates by absorption of organic matter, and by confervoid growths. Indeed, in the case of the water under report, the organic elements had increased threefold in the reservoir during the passage of the water, and had contracted organic impurity to that extent chiefly from exposure to light and air, as certified to by analytical examination of the affluent water flowing into the reservoir, and again of the effluent water as it passed out to the main.

Now, the evils attending an intermittent water supply, to say nothing of the inconvenience arising from the partial supply, long known to those versed in the subject, and of late demonstrated beyond cavil to every one, ought surely to induce the sanitary authorities to provide covered storage reservoirs, and a constant high-service supply to the inhabitants, either by arrangement with the Water Works Company, or perhaps preferably by taking the management into their own hands. Although instances of the unpleasantness, loathsomeness, and possible risk attendant upon the inconstant and household storage system of water supply are of common occurrence, we may mention that at this moment we have in view an important public establishment where the water supply is of the purest and most healthful character possible, and abundant; but from the custom of furnishing it intermittently and storing for daily consumption in cisterns, the water not only has deteriorated much by imbibing foul matter present in the air, but living organisms are found in numbers, many of them of considerable growth, and visible to the naked eye. To all who are in search of a pleasant, healthy, sea-side residence, or desire to go as sojourners for a limited time, we commend Folkestone as promising health for the weak, and recreation to the wearied mind.

THE OPPOSITION TO THE PROTECTION OF RIVERS.

WE are to have, it seems, a fight for our rivers. Probably even worse,—the surrender of our forces. The advocates and effecters of river pollution are in arms. They form two distinct bodies, arrayed under very different banners, but cordially supporting one another. First, there are the open and avowed opponents of legislative interference with the subject. These men have taken the bull by the horns, and met the proposals of the Government by a distinct negative. The rivers, they say, are prescriptively their own; at the mercy, by the common law, of any one who likes to make use of them for the discharge of any obnoxious or putrescent substance. They will use them as they like, and as they have for some time done. The other party of opponents is more insidious, and, possibly, more formidable. They are headed by men who place themselves in front of the crowd, in order that, by walking very slowly, or by merely beating time with the feet without advancing at all, they may effectually check advance. As far as the press goes, the former party have been most energetic and outspoken, and we owe them thanks for the fact. Within the walls of Parliament, the latter party have been more eager; actually having to be called to order by the Speaker of the House of Commons for attempting to attack a Bill which was under the consideration of the House of Peers.

With regard to the straightforward advocates of river pollution, we have little doubt that they can be met, foot to foot, on the broad ground of the principle underlying the unwritten law of England. But it may save time, and cut short debate, to take a different course. The great geometrician who first gave to science the forms of exact demonstration, proceeded, at his choice, by one of two different methods. He either endeavoured, step by step, to add truth to truth; or, admitting for a time the assertions of his adversaries, he showed, by the same inflexible logic, to what results those assertions would lead. And he showed that those results involved self-contradiction. In social matters there is also a *reductio ad absurdum*; although in that case the absurdity may lie, not in self-contradiction, but in contradicting the broad instincts of humanity.

It is thus very pertinent to inquire as to what will be the condition of England by the time when our grandchildren have taken the places we now hold if the rivers are left as unprotected as they now for the most part are.

Unless plague, pestilence, or famine interpose a check to the actual normal increase of our population, the England and Wales of our grandchildren will contain upwards of 40 millions of inhabitants; so that the proportion of residents to the area of the soil will be less than four-fifths of an acre per head (our working men, it should be remembered, are now asking for four acres apiece). The London of that date, supposing always no sudden or violent change, will contain some ten to twelve millions of people. The natural effect, on the one hand, of a thickly-scattered rural population, on the other hand of the dense centres of urban life, on water-springs, land percolation, and all the subsidiary feeders of our rivers will thus be something like that produced in the Thames valley some ten or fifteen years ago. But to this we have to add the enormous rate at which manufacturing processes extend their powers of mischief. Forty years ago the effect of the presence of a paper-mill on a stream was unfelt, even in the immediate vicinity. We can remember catching trout, perch, and pike in the Colne, in Hertfordshire, indifferently above the head, or rather, in the rush of the mill-pool of the paper-mill known as Hamper Mills, two miles from Watford, and at the very mill-tail of that establishment. Loudwater-mills shed no taint on the bright trout-stream which drove their machinery. Old anglers, in all parts of England, can confirm our testimony. What is the case now in rivers where, as in the Wey, paper-mills throw the refuse of their process into the stream? For how many miles do we find a turbid flood replace that first requirement of the valley, a pure river of water? In many places it is much worse. Like the Nile, when smitten by the rod of Moses, of how many an English and Scottish river may it now be said, "and all the fish that was in the river died, and the river stank"?

This process of pollution must either be stopped or not. If it is allowed to continue, what will be the result? By the time to which we have referred, it would be difficult, if not impossible, to find not only a limpid stream, but a glass of pure water, in the greater part of England. For if it be of right that manufacturers, or miners, or the followers of any noxious trades whatever, can make use of the rivers as sewers, it is a universal right. If we are now unable to stop the mischief, we must regard it as irremediable. Every river, stream, and brook throughout the country may be poisoned by any one through whose vicinity it runs, if he find convenience in so doing; if, as the advocates to whom we are replying urge, it is good for trade. So that if London be driven by the pestilent state of her natural sources of water-supply, the Thames and the Lea, to seek for water from Wales or from Westmoreland, her respite will be but short. The magnificent schemes which have already floated before the imagination of enterprising engineers, for bringing the Welsh or the Westmoreland water to London, were estimated to cost from 9,000,000*l.* to 11,000,000*l.* sterling. Perhaps it is not too much to say that our experience of railway estimates, as compared with railway cost, is such as to lead us to put the ultimate expense of such works at from 25,000,000*l.* to 30,000,000*l.* sterling. The quantity of water which this canal was calculated to convey was 230,000,000 gallons per diem: at 30 gallons per head per diem, which is a low proportion for a good urban supply, this would provide for a population of 7,666,666 souls; which may be anticipated as the future population of London by about the year 1925. But supposing this great work effected,—of what permanent utility would it be? "Sauce for goose is sauce for gander." If the Hertfordshire or the Surrey millowner, or

manufacturer, is at liberty to do as he will with his own stream, so is the Westmoreland or the Monmouthshire capitalist. If the Thames may be poisoned, from the Seven Springs to the Nore, so may the Severn, or the Wye, or the Dove, or the Eden. Nor is it only a matter of *may*. It is one of *must*. It is inconceivable that, if it be once admitted that private advantage is to overrule public policy in the matter of the use of river channels, the most far-lying streams will long escape the effects of commercial utilisation of their flow. The result may be attained, faster or slower,—but, if the case of the manufacturers be admitted, it is ultimately certain. That some stop, whether by an outburst of public indignation, or by an enormous reduction of the population of the country by pestilence, would be put to the progress of contamination before the third generation should look around in vain for potable water, we think, indeed, is not to be doubted. But on such an interference with the course of events, even our opponents would hardly be contented to rely. We speak of the result of an uninterrupted course of action such as that which they insist they have a right to carry on, and we say that the result of such a course would be the poisoning of the whole natural water supply of England.

It is not, therefore, a mere sentimental question, as the manufacturers' advocate urges. It is not merely the loss of one main feature of the beauty of the island that we deprecate. It is not only the loss of what may be rendered a very considerable element in the supply of wholesome food; it is no less than the permanent habitability of the kingdom. If any man has the right to foul the smallest brook,—to render it unfit for human use, and the carrier of disease, instead of the source of health,—to man, beast, bird, and fish, there is no safety for our rivers and lakes. And not only is there no safety as a matter of law; but what has been done in many instances shows that there is the most urgent practical danger.

Without affecting a knowledge of the common law of England such as is special to the legal profession, we yet entertain a profound conviction that no one has a legal right to foul a stream. We need not go back to first principles. *Salus populi suprema lex*, is a maxim that lies at the very foundation of human society. The maxim which must be established, if the opposition of the manufacturers to the measures of the Government for the protection of rivers fail, is, *Lucrum privati suprema lex*. The matter is reduced to this simple issue: Is public safety or private gain to carry the day?

We are very far from admitting that the national wealth is increased by those practices of which we complain; increased, that is to say in the best and most profitable manner. We hold an opposite opinion. First, we have the profound conviction, we may say the professional knowledge, that a wise and provident care of all the river-courses of the country would result in an augmentation of the natural produce of the country, to an extent in comparison with which the mere profit of the manufacturers on what they manipulate would be very small. The use of river fish as an article of diet may possibly be over-valued. It is certain that much of our river fish, such as chub, dace, and roach, is hardly worth the trouble of cooking. On the other hand, trout, carp, pike, eels, gudgeons, and some other fish are delicate and nutritious food. But we must not forget what would be the result of a very few years of such a supervision as we require on all those rivers which were formerly accessible to salmon. To how many brooklets would this king of fish ascend, if Thames, Severn, Dee, and their affluents opened ready access to the sea? The degree to which this noble fish formerly supplied food for those who dwelt on the banks of Welsh rivers may be estimated from old documents. In Pembrokeshire, in the indentures of apprentices not very long ago, a clause was inserted to the effect that the boy was not to be made to dine upon salmon more than so many times (three or four, as the case might be) in a week. This shows how much reliance was placed on the rod or the creel for providing animal diet.

The scientific utilisation of our river water for the purposes of irrigation is, however, a subject of incomparably greater magnitude than the supply of fish. It may be said that this is a subject altogether apart from the prevention of the pollution of rivers. But such a remark only shows the prevalence of those limited and contracted notions which have served to paralyse the action of sanitary reform, under the powers, or rather the weaknesses, of the Public Health Act. The measure introduced by the Marquis of Salisbury is the first intimation that the administration has given serious attention to the subject. It is the first evidence afforded that our statesmen have arrived at the knowledge of the elementary fact, that hydraulics form a branch of the special study of the engineer. The power to form watershed districts, which is given by this Bill, is the first rational step towards a systematic solution of the whole great question of water-supply, drainage, and health. The protection of the purity of the streams is one link in this chain. The application of these waters to the production of food for man and for beast, as well as for the supply of drink, and for the purposes of cleanliness, is another.

We suppose that we should be far within the mark if we assume that one-fifth of the area of England and Wales lies within river valleys and basins which might be copiously irrigated at will, if properly engineered for that purpose. In the absence of the proper sources of information, which do not exist, we must put this forward as a guess; but we think it is a guess that errs on the safe side. We are not going at all beyond a deduction from evidence which is familiar to most of us, if we declare that the produce of this area might very readily be doubled by such works as those to which we refer. We should be justified in saying trebled, but let us take the lower rate. What is the result in figures?

To double the produce of one-fifth of the acreage of the United Kingdom would be equivalent to the addition, in round numbers, of 8,000,000 of statute acres to the island. To England alone the addition would be a little over 3,250,000 acres. Considering the quality of the land thus added,—reclaimed, not from absolute, but from relative, waste,—this would be equivalent to an addition to the national wealth of 480,000,000*l.* sterling. It would be equal to the investment of that large sum in the most permanently remunerative form. It would be a boon to the country equal to perhaps the entire sum that was usefully laid out upon our railways. It would be a set-off against the National Debt, that would reduce taxation for the purpose of dividend to a fleabite. And it would not be only a gain in result, but a gain in the course of effecting the work. The stimulus given to labour, to skill, and to all that circulates wealth and comfort in the country, would be of a value hard to estimate. Not a spade could be struck into the soil, in the execution of such a plan, without ample return for the toil. But the arguments now urged against the Bill for the Preservation of Rivers would, if successful, render such a development of the agricultural wealth of England altogether impossible.

We are convinced that, merely as matter of law, the river-spoilers have not a leg to stand on. They rely for immunity on the want of unity in their opponents. The interest of one man to destroy a river is so great, that it defies the infinitesimal interests of a hundred thousand men to protect the stream. Supposing that a manufacturer saved 10,000*l.* a year by the absolute contamination of a great river. To say that 10,000 persons were endamaged to the extent of a pound each per annum might be difficult to prove, but is a very conceivable supposition. But whether it were ten, or twenty, or a hundred thousand people,—each of whom suffered this positive injury, say in cost of bringing pure water from a distance, in failure of crops, or in any other mode,—the individual interest of each would be so small, in proportion to the individual interest of the manufacturer, that he might safely count against their combining to fight him. For the fight would not be a matter of right, but a matter of purse. To establish the common right, fought from court to court up to the House of Peers, would involve an expense as to the incurring of which the manufacturer would feel quite safe against the community. The mischief must be very grave before the mass would move. From one it must run to two, three, ten, or more pounds of damage per head before this would be the case. In any case, it would only be when one or two individuals, resident proprietors, mayors of towns, candidates for public honours, or the like, were driven to bell the cat, and to call on the public to support them in the contest which they commenced, that the great foulers of the streams would have any cause to fear that they must actually confine themselves within the limits of undoubted legal right.

As to the fact that no man can have a legal right to foul a river, we think it cannot be gravely contended that such is the case. The utmost that can be urged is, that a prescriptive right has been allowed to grow up. For so many years, a man may argue, I and my predecessors have thrown our rubbish into this river. We have laid out large sums of money on our works, on the understanding that this practice should be continued, and now you have no right to stop us.

We do not say that it might not be possible, under some circumstances, to make out some claim to compensation on this head. In the case of such a use of the water as does not poison it, as, for instance, in mills driven by water power, no doubt the prescription holds. When our river valleys are properly drained and irrigated, the mill-owners will have to be compensated. As much as this was admitted by certain provisions of the first Public Health Bill of 1872, although they were subsequently withdrawn. But as to absolute fouling of the stream, so as to render it unfit for the use of people lower down its course, we cannot believe that any length of time for which the practice has been unabated can justify the nuisance. It is a very ancient legal maxim, *nullum tempus occurrit regi*,—that is, no prescription of time holds against the crown. The Crown may be regarded as the natural conservator of our rivers. The Thames is the king's highway as much as the Dover-road. We cannot conceive that any bench of judges should rule that it was within the range of individual privilege to destroy the one any more than the other.

The principle that nuisances are not to be tolerated underlies all our social legislation. The only question allowed to be open is, what constitutes a nuisance. It is probable that this question has been complicated by legislation. It may prove that the definition by Act of Parliament, of certain nuisances, may be held to condone the commission of offences not so defined. We are far from saying that such is the case. We think that an able and experienced lawyer would hesitate to give an *ex cathedra* opinion on the subject. But it is in the chapter of possibilities. Of course if such a legal immunity has been unintentionally created, the power that has done the wrong must find the remedy. The breadth given originally by the common law to the term nuisance must not be narrowed by trick.

With regard to the second and more insidious party of the opponents of the Bill, it is probable that their opposition will be limited to such criticisms of detail as would wear out the time or patience of the Legislature, or render the Bill, if passed, practically inoperative. One important point has been indicated, which, of course, can be readily met in the definitions attached to the Bill. That is, that the placing of rubbish so near to a stream that by floods, wind, or any other accidental causes, it may be swept into the stream, must be brought clearly under the penalties of the Act. Another insidious mode of opposition is to raise the cry of "No centralisation." That means, as far as engineering operations are concerned, "No efficient improvement." So long as each petty union or parish is left to its own devices in matters of great national importance, and the proper management of which depends on the knowledge of the physical and geological character of great natural districts of country, so long nothing useful will be done. The friends of health, wealth, and decency are in the minority; of that there can be but little doubt. It is only by organisation that they can be able to bear up against the crushing weight of reluctant inactivity. All our experience of the Public Health measures is definitive on this point. In detail, the health inspector, or the sanitary engineer, will everywhere be beaten, unless it be made clear that each special case is a constituent part of one great whole. As each sewer, or series of sewers, forms but a portion of the channel through which a great watershed sends its rainfall to the sea; as each affluent is a component part of the river system which it feeds; as the freedom of each union from pestilence is the condition of public safety; so is the conception of the entire question of water supply, water distribution, and water outfall as a whole, and the intelligent legislation for, and administration of the subject as a whole, the object of all those who have any intelligent care to promote the health and the wealth of England.

A New Asylum for the Sick Poor, erected on the site of the old Strand Union Workhouse, in Cleveland-street, Fitzroy-square, at a cost of upwards of 32,000*l.*, has been opened.

THE MAMERTINE PRISON: ROME.

THE investigation of the Mamertine prison, undertaken in 1870—1871, has somewhat blunted the point of Juvenal's well-known verses, in which he refers to those happy times under the kings and tribunes when one place of confinement was sufficient for all Rome:—

> "*Felices proavorum atavos, felicia dicas,*
> *Sæcula, qui quondam sub Regibus atque Tribunis*
> *Viderunt uno contentam carcere Romam.*"

For it now appears that instead of containing two small chambers only, as for many ages it has been supposed to do, this "one prison" included a vast system of dungeons, the extent of which can never now be thoroughly explored. And, worse than this, there seems to have been little need of any large place of durance, for there has now been brought to light a passage in direct communication with the Cloaca Maxima, along which the strangled corpse was dragged to be whirled out of the city beneath the dark arches of the sewer.

In fact, this gaol was nothing else but a gate of death, through which the wretched passed. In it the Decemvirs Appius Claudius and Oppius committed suicide; Jugurtha, after having been led in the triumphal procession, was left to die of starvation; the Gallic chieftain Vercingetorix was barbarously murdered by order of Julius Cæsar; the accomplices of Catiline were strangled by command of Cicero; Sejanus and his innocent daughter were put to death; and countless others were butchered during a thousand years of Roman tyranny.

The Roman historians assert, and modern discoveries have, in general, borne out their statements, that the building was commenced by Ancus Martius (B.C. 640), from whom it received the name Mamertine, Mamers being an older form of Mars and Martius; and that it was enlarged by Servius Tullius (B.C. 578); but they give no indication of the extent of the structure.

What first attracted the attention of the antiquary, and led to the rediscovery of so great a part of the old prisons, were the arches of tufa with springing stones of travertine, which are to be seen in the Vicolo del Ghettarello, and which Canina supposed to be the remains of shops round the forum of Julius Cæsar. Getting, then, on the inside of these arches, which are formed of large blocks in the style of the time of Servius Tullius, a man descended into a vaulted chamber dark as night, formerly a butcher's storehouse, and thence through an opening in the floor to a lower and still more loathsome dungeon; here was a trapway in the floor, and beneath it was darkness. He went not down, but passed on to another chamber, in form a trapezium, and having gone through a gap in the brick wall thereof, was in a corridor passing in two directions, and arched over by a semi-hexagonal stone vault. Making his way, then, over ground saturated with water, and stooping low under the ponderous vaults of this horror-striking place, he reached a spot where three passages meet, and turning round a sharp angle he stood before a low iron door, which opened upon the deepest prison of St. Peter. Retracing his steps he followed the passage until he heard before him the gurgling of the cloaca; then he returned to the light, having seen many other chambers also.

Research has demonstrated that some of these chambers are comparatively modern subdivisions; but the original construction of large blocks of tufa clearly distinguishes the original walls from the additions. The prison in this part consists of a series of chambers 40 ft. by 14 ft., two of which have a triangular apse at one end, divided by a wall of partition, which runs into the centre of the triangle. The arrangement is suggestive of torture. Beneath the corridors run drains to the Cloaca Maxima, which, owing to stoppage, had overflowed the passages, so that when the present explorations were commenced, and the archway closed with Mediæval rubblework (since replaced by an iron door) was broken through, the stench which issued forth drove both priests and people from the church above. Along the main corridor are seen branches, probably leading to other chambers, for no external wall has been found.

The prison of St. Peter, which has hitherto been supposed to constitute the whole of the Mamertine Prison, stands at the north-east corner of the Forum Romanum, and since 1598 has been hidden beneath the Church of San Giuseppe dei Falegnami, and its crypt, the chapel of the Crucifixion. It consists of two chambers, the one over the other, built in the most massive style of Etruscan architecture, and separated by a vault of travertine, with an opening in its centre, through which the prisoners were let down into the lower den. This vault is not constructed with voussoirs, but has been formed by corbelling out the circular wall, so that it is in shape a cone truncated by the pavement of the upper chamber; this mode of construction, which we see in the monuments of Cære and the Pelasgic remains of Greece, proves the very high antiquity of the work. The lower chamber is circular, with a diameter of 20 ft., and is partly excavated in the tufa rock, and partly built of large blocks of tufa. Here is the iron door mentioned above, and the spring which sprang up to enable St. Peter to baptise his gaolers and forty other men. It is fitted up as an oratory. The upper chamber is oblong, 30 ft. by 22 ft., and about 16 ft. in height, and is constructed with large masses of stone of the time of the kings, without cement. It has a vault of travertine. On the cornice, in front of this chamber, is an inscription, with the names of the consuls of the time of Tiberius, recording the fact of its having been rebuilt; but the walls of the lower chamber, being considered as foundations only, were not altered. A very uncomplimentary insinuation as to the thickness of St. Peter's skull is made by "the Church" when she points out a deep indentation on the stone-work of the prison as having been made by the head of the Prince of the Apostles, when thrust against the wall by a brutal gaoler.

Rome.

COINS: MEDALS.

"THE Fifth Annual Report of the Deputy-Master of the Mint" has lately appeared, and a glance at its pages leads us to deplore the still-delayed provision of commodious premises, and adequate machinery, for supplying the ever-increasing demand for fresh coin in this country and the colonies. It is nothing less than a disgrace to England that its Mint has "machinery more obsolete and inefficient than that of any mint in Europe, not excepting that at Constantinople"; and that, "whereas foreign countries with large metallic circulations, such as France and Germany, possess many mints, the United Kingdom and the Colonies depend for Imperial coinage on the London Mint alone, aided by its branches at Sydney and Melbourne, from which gold coin only is issued."

One result of this has been that, "in September last it became necessary to suspend the operations of the department for a period of six weeks, in order that the machinery might be again put under repair, notwithstanding that a similar suspension, for twelve weeks, had taken place in the previous year." In consequence of this, a large supply of pence and half-pence being required for the London district, it was found necessary to have recourse to Messrs. Heaton & Sons, of Birmingham, for help; and a contract was entered into with them for a hundred tons of coin, of which the nominal value was 41,962*l.*, involving, of course, a great increase of expense, from having to put out the work.

We may remark, incidentally, that the coins struck at Birmingham, under this contract, bear the Mint-mark, "H," on the reverse, under the date, to distinguish them from those made at the Mint; and this confirms the belief which most persons entertained, that a confession of forgery of these "H" marked coins, which appeared in the papers some time since, was a hoax.

The present arrangements of the machinery at the Mint render it impossible to strike at one time more than one kind of metal, or one denomination of coin. The supply of silver coin during 1874 was quite inadequate, and explains why one had as much difficulty in finding six-pence as the woman with the broom in Mr. Millais's picture.

In a tract of *eighty* pages, exactly *two* are devoted to a "History of Medals," the deputy-master, no doubt, viewing the subject with an economical rather than an æsthetic feeling. The notice of medallic art ranges from a Syracusan coin representing Philistis, wife of Hieron II., to those now being struck for the troops engaged in the Ashantee war; and in covering so vast an era with so brief a notice, we could hardly look for a very exhaustive account. Still, in any notice of British die-sinking, at least one line should have been given to a mention of the remarkable series of twenty-two medals already produced, at a cost of more than 5,000*l.*, by the Art-Union of London, commemorating the most famous painters, sculptors, and architects of England; which is still going on, and which will favourably compare, in design and execution, with any specimen ever produced of the medallic art. Of the existence of this truly national work, the deputy-master could scarcely be ignorant, seeing that the Wyons—father, son, and nephews—and G. G. Adams, at different times employed by the Mint, have been, one or other of them, continuously at work on the medals of the Art-Union for five-and-twenty years, and would hardly fail to show at the Mint, from time to time, proofs of the works they had in hand.

THE DISCOVERIES IN THE TROAD.

ON Thursday, the 24th ult., Dr. Schliemann read a paper at a meeting of the Society of Antiquaries, on "The Discovery of Homeric Troy," and was most warmly received. He gave a general outline of his investigations, with which our readers have long been familiar. At the close of his most interesting account,

The Right Hon. W. E. Gladstone, who was present, was invited to open the discussion, and in the course of an admirable address said, I think our debt, as regards Dr. Schliemann, is really independent of the correctness or incorrectness of his opinions. We owe a debt to him for his devotion and for his example—a debt which could never be cancelled even if he were to fail in the proof of any of his conclusions. But I must also say it appears to me, endeavouring to look calmly at the matter, that Dr. Schliemann's main conclusion is exceedingly difficult to shake. I myself have for many years been very strongly what may be called a believer in Homer and the Homeric poems, as far as regards their poetical unity and as far as regards their historical character, in the highest sense of history—that is, as regards the manners and institutions of mankind. But with respect to the question of the facts of the poems as distinguished from the manners, the institutions, and the characters described, on this matter my mind has been altogether open, and, I think, to some extent impartial. I am bound to say, also, I have always had the impression—I do not know whether Dr. Schliemann shares it or not—that it is extremely difficult as to certain details to reconcile the topographical features of the Plain of Troy, as it now exists, with the topography described in the "Iliad." I have never been able fully to embrace the opinion current until quite recently that Bunarbashi was the site of Troy; for it was quite impossible to reconcile that site with the distance from the sea and to bring together the natural features of the place with the described features of the poem. But I do not see by what arguments are to be met the proofs adduced by Dr. Schliemann in favour of Hissarlik. He has shown indubitably that at a great depth below the surface he has found the remains of a city of a certain size and a certain advance in civilisation—a city which underwent a sudden and violent destruction by means of fire,—and so far he is in entire and indubitable accordance with Trojan and Homeric traditions. Looking further into the details of Dr. Schliemann's discoveries and the details of the Homeric poem, in almost every point on which I have had the opportunity of instituting a comparison there is a wonderfully precise correspondence between the facts of the poem and the evidence afforded by the objects which he has discovered in the recesses he has unveiled. One of the most important pieces of evidence is that which relates to the use of metals, and in this great department the discoveries correspond with the representations of Homer. It is undoubted that Dr. Schliemann has discovered objects manufactured of copper, while, on the other hand, he has not found a trace of iron in Troy. I am not quite certain from my recollection of the text now, but do not think Homer ever speaks of the use of iron at Troy. He speaks of iron in his own time, but as a thing so extremely rare and valuable as to approach in character the precious metals. Again, with respect to its non-appearance among Dr. Schliemann's objects, we must bear in mind that it is an extremely perishable metal when exposed to the influence of corrosion, and it would not, therefore, be surprising, if every foot of the site were turned up, that no iron relics should be discovered. Then, again, with regard to pottery, Dr. Schliemann tells us that in this third pre-historic city, which he takes to be the city of Priam, the pottery was generally hand-made, but that he found in that city a certain number of plates, which were made by the potter's

wheel. If that is so, it is evident that the potter's wheel was just beginning to be used, and we may assume that it had not yet been employed in producing works of art. This, I think, is in precise correspondence with the stage of the potter's art as we find it in Homer, who only just mentions the potter's wheel, but does not refer to any work of art, or even any object—certainly to no important object—of pottery. There are a large number of points to which it is impossible now to refer; but I am bound to confess that I do not think it will be possible to thrust back the period of the existence of Troy to an antiquity so remote as that suggested by Dr. Schliemann. First, the evidence of the poem is against it. One of the principal of Homer's genealogies—which really conveys his idea of history, for he had no knowledge of chronology—is that of the family of Priam; and this gives Dardanus as the founder six generations before Priam and the Trojan war. Consequently, six generations before that war there was no Troy. Now, Dardanus's name is found in Egyptian inscriptions, whose chronology has now attained a considerable degree of fixity, of the time of the nineteenth Egyptian dynasty, which may be stated to have begun somewhere about the fifteenth century before Christ. The accession of Rameses II. may be placed about half a century afterwards, or say at the beginning of the fifteenth century before Christ. That, however, will not be quite long enough for the purposes of Dr. Schliemann. It is a curious fact that, according to the Egyptian inscriptions, the time of the reign of Sesostris, or Rameses II., was the time when there was a strong combination of the Assyrians and Khita, or Hittites, which included the Lycians, Mœsians, the Dardanians, and the people of Asia Minor, to check Egyptian power. Therefore, in the fifteenth century before Christ the name of the Dardanians still was in possession of the plain of Troas; and Troy did not yet exist, because afterwards their historical names are blended. It is therefore quite plain that you cannot undertake to throw back the Troy of Priam to such a remote antiquity as Dr. Schliemann is disposed to claim for it, and I think if he gets an antiquity of 1,300 or 1,400 years before Christ he ought to be very well satisfied.

THE RATEABILITY OF OXFORD UNIVERSITY LANDS.

AN Act of Parliament is in progress declaring that all the land and buildings within the University of Oxford, which are now by law exempted from being rated to the relief of the poor, shall in future be rateable to the relief of the poor in the same way as any other rateable property within the University; and for this purpose Christ Church College is to be deemed to be one of the colleges of the University. The University, with its colleges, halls, and lands, whether such lands are in the occupation of the University, or of any member, or professor, or officer of the University, in right of such membership or office, is to be deemed to be a separate parish.

IMPROVEMENTS AT BRADFORD.

BY the demolition of the buildings in and around Union-passage, one of the few remaining links that connected new with old Bradford will be removed, and in a very short time New Darley-street, with its spacious frontages and commanding architecture, will have obliterated all trace of this ancient landmark.

At the bottom of New Darley-street is about to be built the Bradford Liberal Club-house, and shops and other business premises. The plans of the new buildings have been prepared by the architects, Messrs. Lockwood & Mawson, who have also in hand the plans for the shops to be erected on the adjoining plot of land, belonging to Mr. Varley and Messrs. M. Rhodes & Son. By this means arrangements have been made by which the whole of the buildings on the plot of land bounded by Kirkgate, Queensgate, New Darley-street, and Hustlergate will be of a uniform style of architecture. The plans which have been prepared for the Liberal Club show a neat elevation in the Italian style, without any great amount of ornamentation, except at the frontage to Hustlergate and Bank-street, and at the principal entrance to the Club-house in Darley-street, at both of which places something more pretentious in the way of architectural beauty is to be attempted.

An immense pile of warehouses is in course of erection by Mr. Thos. Taylor, woolstapler, Bradford, and Mr. Geo. Hargreaves, jun., Shipley, on the site of the old Union Foundry, Manchester-road. When completed, the various blocks will represent an amount fully equal to 250,000*l*. The construction is being carried out by Messrs. Taylor & Hargreaves themselves, who make their own bricks from clay got on the spot, prepare wood, dress stone, grind mortar, and do a great deal of this work by steam-power. Mr. E. Atkinson is the clerk of the works; Messrs. Jackson & Longley are the architects.

KURRACHEE BREAKWATER.

IT is said that a serious rift has recently disclosed itself in this famous breakwater. The outer portion reaching nearly half across the pier, or mole, has parted from the inner half of the structure, which remains quite firm. The rent thus made varies from 2 in. to nearly 1 ft. wide, and it is reported that the detached outer portion may be seen to move with the heaving tide or swell outside. Steps have been taken to arrest the possible outshoot of the concrete. Certain gaps or interstices were originally left in the 27-ton concrete blocks of which the mole is built, and strong teak piles have now been driven into these holes, and are connected by chains with the inner and secure portions of the pier. As far as the cause of the disaster is concerned, it is supposed by some that the force of the surge, or the suction of the ground swell that sweeps round the coast, has drawn away a great part of the rubble base on which the concrete blocks rested. Others imagine that the action of the tides and currents has been of a sufficiently scouring nature to fetch away the sand or shell *débris* on which the rubble was thrown. The former supposition is more probable.

DISPOSAL OF TOWN SEWAGE.

THE Local Government Board, wishing to obtain recent and reliable information as to some of the modes of dealing with town sewage now in use, have directed special inquiries into the practical efficiency of prominent systems of sewage disposal in operation—namely, sewage farms and sewage irrigation, sewage filtration through land, and sewage clarification by treatment with chemicals, and deposition in tanks,—selected works which have been in operation some time will be examined and reported upon. Mr. Clare Sewell Reed, M.P., Parliamentary Secretary; Mr. Robert Rawlinson, C.B., Chief Inspector to the Board; and Mr. S. F. Smith, Assistant Inspector, have been deputed to the work. The inspections and inquiries will be extended through the autumn, the return being completed as soon as practicable.

It may be hoped that we shall now obtain some definite information.

A NEW STREET FROM HOLBORN TO THE STRAND.

THE Strand District Board of Works are taking steps to secure the construction of a new street between Holborn and the Strand. The subject was discussed at their meeting last week, when it was urged that the proposed new street could be made at a comparatively small cost, and would be a great improvement by clearing away a great number of crowded and unhealthy dwellings in the neighbourhood of Clare-market. The following resolution, proposed by Mr. Fowler, was carried unanimously: "That in view of the completion of the new Law Courts, and no provision being made for a direct line of street from Holborn to the Strand, and the growing necessity for such communication, the Metropolitan Board of Works be memorialised to construct a new line of street either through Gate-street, Lincoln's-inn-fields, Clare-market, or some other desirable route, and carry the same out as a metropolitan improvement, and that the St. Giles's and Holborn District Boards be requested to co-operate with this Board to attain this important object."

Land in Berkshire.—The Barton Court Estate, near Hungerford, Berks, comprising about 2,500 acres, and yielding an annual revenue of 5,000*l*., has been purchased for 120,000*l*. by Sir Richard Sutton, bart., of Benham Park, Newbury, who is the proprietor of neighbouring property.

THE ROADS AND PAVEMENTS OF LONDON.

THE conditions of the surface formation, paving, and cleansing of the streets of the metropolis, as influencing the cleanliness and health of the population, its circulation of passengers and goods, and the extent to which those conditions may be improved by the application of sanitary engineering and mechanical science; have been the subject of inquiry by a committee appointed by the Society of Arts.

The first course of inquiry was to ascertain the intrinsic qualities of the works required to be done; the next to determine the character of the agencies required to do them. They have just now made their report, and from it we will take a few passages. The results of earlier inquiries are first related:—

"The domestic fire acts as a pump, which draws in the air of the street, and with it the filth of the street, for deposit on the person, clothes, and furniture. A lady living near the drive in Hyde Park stated that she could write her name twice a day on the dust on her piano; that is to say, in summer time, when there are comparatively few fires and little soot. The rate of accumulation on the skin may be observed by well-to-do people, who have to wash their hands and faces two or three times a day to maintain cleanliness; and as to clothes, by an increased rate of expense of washing. The estimated washing bill of the metropolis is upwards of 5,000,000*l*. per annum. As to the special sanitary effect of the chief ingredient of the filth of the street, it is found that the gaseous products of putrid and decomposed horse-dung partake in a greater or less degree of the pernicious character of those from the human fæces. In urban districts, which have been well drained, with proper self-cleansing sewers, and freed from emanations from them, fever, nevertheless, has been found to lurk in those quarters where the surface paving and the surface cleansing is bad, especially amongst the children who are much out in the streets, and who, from their habit of playing with street dirt, and their lower stature, are more within the influence of low surface emanations than adults. On the other hand, the extension of impermeable paving alone, other conditions as to drainage, &c., remaining the same, has been attended with a marked reduction of malarious disease. The greater part of the dirt deposited on the skin, which constitutes the visible filth and squalor of the lower class of the population in towns, is considered to be chiefly composed of street or road mud, or of pulverised dung. The effect of the deposit of dirt on the skin is displayed by the effect of its effectual removal by regular ablutions with tepid water. This has been marked in the instance of some ragged schools, where the assemblage of dirty children created an atmosphere so offensive, and attended by so much illness to the teachers as well as to the children, that for their protection, as well as for the protection of the teachers, it was found necessary to have recourse to ablution with tepid water as a means of prevention, and thus the condition of the atmosphere was considerably freshened, and the health of the children and of the teachers considerably improved. As a rule in sanitary science, the death-rates of children are considered the most important tests of general local sanitary conditions, as children are the least affected by occupation, and the most kept within those conditions.

The effect of skin cleanliness on health has been most marked on numbers, in children's institutions, where sanitary results may be the best discriminated. In some of these institutions, in old buildings, the death-rate had been regularly for years about 12 per 1,000; but a removal of cesspools, an improvement in the drainage, and better ventilation, producing what may be called comparative air cleanliness, were attended by a reduction of the death-rate to 8 per 1,000. The next step in sanitary improvement was to effect skin cleanliness by the introduction of regular, complete head to foot ablution with tepid water, and this was attended by a further reduction of the death-rate from 8 to 4 in the 1,000. Other instances gave as high a value as one-third as the result due to the sanitary efficiency of complete skin cleanliness as a preventive."

"People who are nice in the air they breathe, as well as in outward personal cleanliness, will let as little as possible of street-air enter their houses, except through screens of the finest wire-gauze,—as window blinds,—as did our late

member, Mr. Appold. He stated that in the City he found it necessary to have his screens washed every day, to prevent their being clogged up, and that, on foggy days, they were choked up in three hours. Parliament, for its own protection against the common street air, has had recourse to science to free that air, as well as might be done, from its grosser impurities. The late Dr. Reid, to whom the task was first confided, proposed to avoid the street air by drawing down less impure air from the superior strata at the top of the two towers, the Victoria and the clock tower; but he found, even then, that at times Parliament might be exposed to polluted currents from the tall chimneys of manufactories in the neighbourhood: one a bone-boiling manufactory, another a muriatic acid manufactory. Being driven back for a supply to the street air, he resorted to various contrivances to screen it, and at times to wash it."

"The importation of granite is upwards of 600 tons per annum, to supply the abrasion and wear of the streets, besides large quantities of flint and other cheaper stones obtainable near London.

The special effects of insoluble matter as detritus are the most clearly distinguishable in Continental towns, where there is very little traffic, and little dung-dust; but where there is a great deal of sand or inorganic dust, the excess of this condition is attended by an excess of disease of the respiratory organs. The influences of particular sorts of street and road dust are instanced by the effect of constant exposure to them in highly concentrated states;—as of abraded granite, by the diseases of the constant workers in granite in Scotland; of abraded iron (which is found in considerable proportions in streets of great traffic), by the diseases of the Sheffield knife-grinders and metal-workers;—of powdered flints, which are extensively used on metropolitan suburban roads, by the special effects of constant working in flint dust in the potteries, where it is known that it cuts short the lives of robust persons in an average of twelve years. Dr. James Sutherland, the Army Sanitary Commissioner, thus describes the production of flint spiculæ, which are peculiarly irritating. In certain districts of the metropolis 'the road-making consists of emptying and spreading ordinary flints, one of the most brittle of all materials. The first heavy cart which passes over it fractures the flint, and with moderate traffic—as, for instance, on the roads leading up to the Crystal Palace—the pulverising of the flint is so rapid that a layer rarely lasts above three weeks, and the entire mass is then scraped off and used by builders instead of sand. The spicular flint particles are wafted about by the slightest wind, and enter all the houses, and are breathed by all passengers. The cost to the ratepayers must be very great, while no one object of a really scientific and healthy road is attained.' The dry days of March, when winds and dust predominate, are, as medical men are aware, attended by numerous affections of the mucous membranes of the throat and frequently of the eyes. Foul air leads to the disagreeable habit of expectoration."

"In addition to the marked evils noted as arising from the movable matter on street surfaces—dung, dust, and abraded stones—there is great sanitary evil arising from the emanations of immovable absorbed matter between the stones of the pavement, and excrementitous matter retained beneath them. Excrement-sudden soils are distinguished as seats of epidemic disease amongst populations."

"The coarseness and want of refinement in the common local administrations is displayed not alone by the filth of the streets under their charge, but by the disregard of the production of pain and other evils by the noise of traffic over different sorts of paving of the carriage-ways."

"Double-paned windows exclude much noise and save much warmth; but the annoyance caused by the vibration of the buildings continues where the roads are rough. Relief is provided for the wealthy by covering the roadways before their houses with straw, but the great majority of persons and the poor cannot afford the expense of such relief. It is estimated that in urban districts there are always about 10 per cent. of cases of 'bed-lying' sickness amongst the population. In a mile of public thoroughfare there will be constantly between fifty and a hundred ailing persons whose sufferings will be specially aggravated by such conditions of noise and vibration as those described."

"The general conclusion arrived at is that, as a rule, all loud noise from vehicular transit in the streets,—all grinding and rumbling of wheels, and jolting and banging of carts and carriages,—all vibrations of the houses and shaking of doors and windows,—denote a greater or less waste of force, and a low state of science and knowledge on the part of those who are charged with the construction and maintenance of the public thoroughfares. To the same ignorance may be charged the greater proportion of all dust, dirt, and mud, and all bad smells on street surfaces, as well as of the dirt on clothes and on the person from the dirt and dust of the street, and the nervous agitation, restlessness, and sleeplessness at nights from the noise of carts and carriages in the streets.

Loss of Tractive Force by Bad Road Construction and Bad Cleansing.

The loss of traction force, even from small elevations, such as those occasioned chiefly by bad cleansing, is stated by Sir Henry Parnell's work on roads as the result of experiments. The draught is stated to have been:—

On a paved road	2
On a well-broken stone road in a clean state	5
On the same covered with dust	8
On the same wet and muddy	10
On a gravel or flint road, clean	19
On the same road, wet and muddy	32

The effect of small elevations of surface in occasioning loss of force, may be observed in the retardation of the heaviest railway trains by scattering gravel on the railway.

It was shown by experiments with Sir John M'Neill's "road indicator," that by a granite tramway, on a slope of 1 in 35, the power required to draw a ton, was reduced from 294 lb. to 132 lb.

"The losses occasioned by differences of conditions of the surface are aggravated by frequent unnecessary differences of inclines. Assuming the surface pavement of the streets to be smooth, and as good as the surfaces of iron railways, the loss of force from street inclines will be as great as it is demonstrated to be on railway inclines. The late Mr. Butler Williams, C.E., formerly engaged on the Ordnance Survey in Ireland, and afterwards professor of geodesy at the College of Civil Engineers at Putney, gave some evidence on this subject before the Health of Towns Commissioners in 1844. He displayed a study of the plan of Sir Christopher Wren for the rebuilding of the City of London after the Great Fire.* He presented that plan as displaying the enormous loss, by ignorance or by the absence of science in the directing minds of local public works. He showed the gain in distance by direct lines, as well as the gain from avoiding the losses of force by bad gradients. To illustrate this loss, he got a survey of two lines, one from Holborn to Cheapside, and the other from Fleet-street to Cheapside, and taking the then traffic over these two lines, he showed that the loss of time and power entailed by the defective gradients and increased distances could not be less than 100,000*l.* per annum. Such losses of force from defective gradients, it will be perceived from a view of any contour map, were more or less entailed over the whole area, from setting aside Sir Christopher Wren's plan of rebuilding the city as nearly as possible on a level plane. It may be mentioned, in the way of illustration of administrative principle, that Sir Christopher Wren would have excluded blind alleys and inferior dwellings, and also graveyards and noxious trades, and yet have given to every owner the same area, though perhaps in a different, and invariably in a better, position, with frontages in wider streets, with better sweeps of winds and ventilation. The plan was approved by the king and the most instructed minds of the day; but the corporate, or what may be called the vestral, minds of the day prevailed in retaining the same old lines, the old gradients, and the old structures, and, in doing so, it is estimated by sanitary authorities, they entailed upon the population, besides the loss upon the traffic, a death-rate greatly in excess of what there would have been under the rudimentary sanitary conditions which Sir Christopher Wren's plan would have achieved.

The Professor observed,—'With respect to old districts, improvements of importance might be accomplished without interfering with the convenient access to houses, and at very moderate cost, by taking advantage of the repavement of streets, to level or reduce by a few feet the mere surface irregularities, such as may be noticed in many of the thoroughfares of the metropolis. In the repavement of the streets, as generally conducted at present, the old curves following the existing irregularities of the surface are retained, whereas, not unfrequently, an excavation of even as little as 1 ft. or 2 ft. at one point, and a corresponding filling up of 1 ft. or 2 ft. at another point, would remove irregularities which, as far as they go, are objectionable. Every foot reduced in the rise of a thoroughfare open to great traffic produces a corresponding saving of power by no means unimportant.'

After adducing various examples of the wastefulness of ignorance, Professor Butler Williams observed, 'They show that, for amendment, you must have men of extended views, capable of embracing all the elements that combine to produce the results that ought to be obtained, and that it can scarcely be expedient in most cases that men of limited education should be called upon to decide on important sanitary matters.'

The Distinct Provision for Wheel Tracks and for Horse Tracks in Roadways.

The first conclusion arrived at by the General Board of Health for the improvement of the pavement of the metropolis was that provision must be made of smooth tracks for the wheels, distinct from the provision for the track and the foothold of the horses. This distinct provision had, indeed, long been made and successfully applied in the cities of Northern Italy. Lord Palmerston once called public attention to it, and expressed a hope that so luxuriant and excellent a system might be introduced into this country. Mr. A. Stevenson, C.E., calls attention to it in his article on road construction, in the 'Encyclopædia Britannica.' Mr. P. Le Neve Foster, jun., the son of our respected secretary, a civil engineer in practice in Italy, has been so good as to give us sketches and a report descriptive of the method in which the principle is applied in Milan and other cities, together with the costs in detail. On wide thoroughfares, as at Milan, there are three or four lines of wheel-track of this description. On some, however, the horse-track is paved with Dutch clinker bricks. The principle of the Italian roadway described has, indeed, been applied by stone trams as wheel-tracks, on a part of the road to the Commercial Docks, at the East End of London, in several narrow streets in the City of London, at Holyhead, and in other places. Some experiments made by Sir John M'Neill on the granite tramways at Holyhead, and others on the granite tramways near the Commercial Docks, demonstrated that by their use a saving of more than half the horse-power, as compared with the common roads, was effected. It was shown that whilst the horse retained his rough foothold, considerable gain in force is obtained by the tramways in ascending inclines. On an incline of 1 in 20, the power required to draw a ton was reduced from 295 lb. to 132 lb. An incline of 1 in 35 might be ascended at a good rate of speed, and descended at twelve miles an hour without risk. In passing over these granite tramways, horses will have two feet on the roughened foothold; they do not fall, and generally there is no more slipping on them than on the common granite roads in the common conditions as to cleansing. When they were first laid down in England, each wheel-track had kerbs; but in recent constructions they are dispensed with, and vehicles may freely move from one part of the road to another."

After observations and particulars as to street cleansing, the committee arrive at the following—

Primary Conclusions.

On the whole, it will be found that there have been established, as standing demonstrations long made, but existing fruitlessly, during nearly the last quarter of a century, for the guidance of local administrations, viz.:—

First, that the cleansing of the surfaces, and the preservation of the subsoils immediately beneath them, from putrid animal or vegetable matter in suspension or solution, is an important branch of sanitary art and science, powerfully affecting the health of the population, which ought, for the safety of the health and the lives of the population, to be placed under the responsible supervision of sanitary officers and special engineers.

Second, as regards the surface pavement of the carriage-ways of streets such as those in the metropolis, by the right application of engineering science and art in the improved levelling and paving, the tractive force required for persons and goods may be reduced more than one-half,

* A view of the City constructed on the lines of this plan will be found in our present number.—ED.

with a proportionate reduction of street dirt and dust.

Third, by the application of special engineering and mechanical art in hydraulic and drainage arrangements, the time and expense of the surface cleansing of streets may be reduced more than one-half, and injuries to goods and furniture, and clothes, as well as excessive dirt on the person, and serious injuries to the health, may be prevented.

Mal-Administrative Conditions Productive of Public Insecurity and Waste.

The mass of direct evils, annoyances, and inconveniences fall, not upon the 200 or 300 owners of shops on the line of Cheapside, but upon the owners of the 12,000 vehicles passing daily along it. They fall not upon the shopkeepers, but upon the passengers, who are estimated at three-quarters of a million, a ten times greater number passing through the City daily than the total number of its inhabitants.

"In answer to inquiries as to the experience on this line, one of the shopkeepers in Cheapside stated that he believed that asphalte was less slippery than the granite pavement. When the pavement was of granite, the falls of horses before that shop were about three a day, whereas since the asphalte there had only been about two in a day,—that is to say, out of some fifty accidents daily along that line. But as to those three or those two regular falls daily, had he made no representation to the local authorities, or to those who had charge of the roads? No, he had not. The horses were not his, and so neither he nor other shopkeepers appeared to have been moved by the scenes of daily animal suffering to make any effort for its prevention. Very recently it appears that the slipping along that line on account of its "greasy" condition, occasioned an outcry for better cleansing, when this outcry was met in a manner which, if it were culpably clumsy, might be malice, for the street was so flooded with water as to make the entire roadway "a slop." The security to the horses was, however, at once complete; but there was an inconvenience to the shopkeepers from that "slop," and on a petition from them it was discontinued; that is, the safety of the passengers and the horses were sacrificed, and continued excessive cruelty to horses was maintained, and a most valuable material, discredited, on account really, as it would appear, of a mere ignorance of administration and inaptitude in cleansing.

The great vehicular interest, and the far greater interest of foot-passengers whose lives and property are exposed, and who are subjected to continued terrors and annoyances, are evidently unrepresented, and left without effective protection.

The case will be found to be clear for a wider and more skilled representation on the part of the public, and for a competent and more general responsibility than is practicable by non-scientific bodies like the overseers or vestrymen. Some of the surveyors and other officers appear to be in advance of their work, but when amendments have been suggested to them they have declared that it was of no use to propose them, as it was beyond the capacity of their boards to entertain them. But the administrative areas are in conditions of mere barbarism and ignorance as to road formation, *cleansing*, and maintenance, and in such small and fragmentary patches as to preclude economical applications of science and art requisite for the purpose."

The incoherent and obstructive condition of the local administrative arrangements of the metropolis will appear on consideration of a tabular view, presented by Mr. Sharp, showing the division of the main thoroughfares amongst independent vestries or other local authorities.

As a summary,—from Hammersmith to Bow is about 10 miles, and is under 10 authorities; from Hammersmith to East India Docks is about 11½ miles, and is under 13 authorities; from Stamford-hill to Tooting Graveney is about 10 miles, and is under 9 authorities; from Highgate to Tooting Graveney is about 11 miles, and is under 6 authorities; from Highgate to Norwood is about 10 miles, and is under 9 authorities; from Upper Clapton to Roehampton-gate, Richmond Park, is about 13 miles, and is under 14 authorities; from Cricklewood to Putney Bottom is about 12 miles, and is under 7 authorities. That is to say, 77 miles of thoroughfare are under the charge of 68 vestries or independent local authorities.

Some of these parochial or vestry jurisdictions divide the streets longitudinally, and one half of a street is paved at one time, and the other at another time, and sometimes by a different method; one half is swept at one time and the other half at another time, to the detriment of both operations. Sir Joseph Whitworth found that he would have no less than four distinct authorities to deal with to effect the cleansing of the Strand by his machine. Having other things to attend to he was compelled, by the fragmentary condition of the administration in the metropolis, to abandon the attempt to deal with it.

The Committee call attention to the information collected, specially in respect to the new materials and to the chief new methods of pavement lately introduced and tried in London.

It is to be borne in mind that the essential qualities for our urban pavement are perfect impermeability, cleansibilty, smoothness, and tenacity for wheel-traction; granulated, roughness for horse-traction, and noiselessness.

The committee arrive at a very favourable opinion as to asphalte:—

"The absence of any returns of the traffic on the lines paved with the Limmer and other asphaltes, prevents the like comparison being made in respect to them, but they each present examples of durability greatly in advance of the granite. At the same rate of wear as the granites, so far as they could be compared, the chief specimens of the asphaltes would have disappeared. The astonishing relative durability of the chief of these materials is accompanied by a relative reduction of the amount of abraded dust such as is ground off the granite, and especially from the Macadam roads on Westminster Bridge, to the extent of upwards of four inches annually, producing that dust which is so peculiarly irritating and injurious to the respiratory organs. This tenacity of the material is accompanied by a feeling almost of elasticity to the tread of the foot, and yet a great non-conductibility of vibration or of sound. There is less of 'sonority' than in the granite tramways; the noise of the wheels is suppressed, and only a clack of the horses' shoes is heard."

The conclusions of the Metropolitan Sanitary Commission as to the drainage works of the metropolis, appear to be applicable to its street and road works:—"The more the investigation advances, the more is it apparent that the progressive improvement and proper execution of this class of public works, together with the appliances of hydraulic engineering, cannot be reasonably expected to be dealt with incidentally or collaterally to ordinary occupation, or even to connected professional pursuits, but require a degree of special study, which not only places them beyond the sphere of the discussion of popular administrative bodies, but beyond that of ordinary professional engineering and architectural practice. In justification of this conclusion, and to show the evil of the perverted application of names of high general professional authority, we might adduce examples of the most defective works which have received their sanction. All the improvements which the public have yet obtained in this branch of public works have been the result of the special and undivided practical attention of well-qualified paid officers; and it appears to us that further improvement must be sought by the same means, and that one of the chief objects of future administrative arrangements must be to secure, protect, and encourage the zealous undivided attention and efficient labour of such officers."

Strong allegations are rife as to the predominance of the sinister interests of contractors at local boards, making them intrenchments against improvements. It may be so, and in the absence of effective securities for a correct expenditure of the public rates, it is very likely to be so; but we have not the means, nor have we deemed it our province, to inquire as to the foundation for such allegations. Moreover, we have the conviction, that however pure may be the expenditure in intent, an efficient and economical administration is impracticable in such narrow areas as those to which it is left unaided and unguarded by any fitting experience.

The following are the

General Conclusions arrived at.

"On a review of the information collected by the Committee on the common methods of forming, paving, maintaining, and cleansing the surfaces of streets and roads in the metropolis, in respect to the science and art conclusions herein before stated, namely, that they powerfully affect the health of the population to an extent heretofore unknown and disregarded, and ought to be brought within the cognizance of sanitary officers, that the street and road formation might be so far improved on a long-tried principle as to reduce the tractive force needed for traffic by more than one-half, and that a threefold amount of street cleanliness was obtainable by improved machinery, without any augmentation of the usual rate of expense for hand-cleansing; we find that from want of science and art instruction, from ignorance and apathy, these demonstrations have been of little or no avail, and that the general condition of the streets, in excessive filth, and noise, and disorder, are the reflex of the general condition of an expensive local administration;—that the common defective conditions of the greater proportions of the surface, formation, paving, and cleansing of the streets, with the increasing traffic of the increasing population of the metropolis, occasion much filth, consisting chiefly of pulverised horsedung and granite dust, to be deposited on the person, clothes, furniture, and houses of the population; that the filth so deposited is highly injurious to health, especially to an extent hitherto unregarded of the children of the wage classes of the population, as well as the adults of those classes, who have little means of frequently washing themselves to remove it; that such aggravations of the conditions of personal filth and squalor, besides being detrimental to health, have a pernicious effect in lowering the self-respect and the moral status of the wage classes of the population; that the excessive noise occasioned by vehicular traffic over the common pavements is a cause of suffering to invalids, occasions doors and windows to be shut to keep it out, and ventilation to be obstructed. We find, moreover,—

That on an average upwards of two hundred persons are annually killed, and upwards of ten times that number maimed or injured in the streets of the metropolis, the greatest proportion of which injuries occur on what are called 'greasy days,' or days of excessive slipperiness, occasioned by defective cleansing;

That such conditions of bad cleansing and defective methods and bad paving are the occasion of excessive cruelty, accidents, and injuries to horses, and fractures to vehicles;

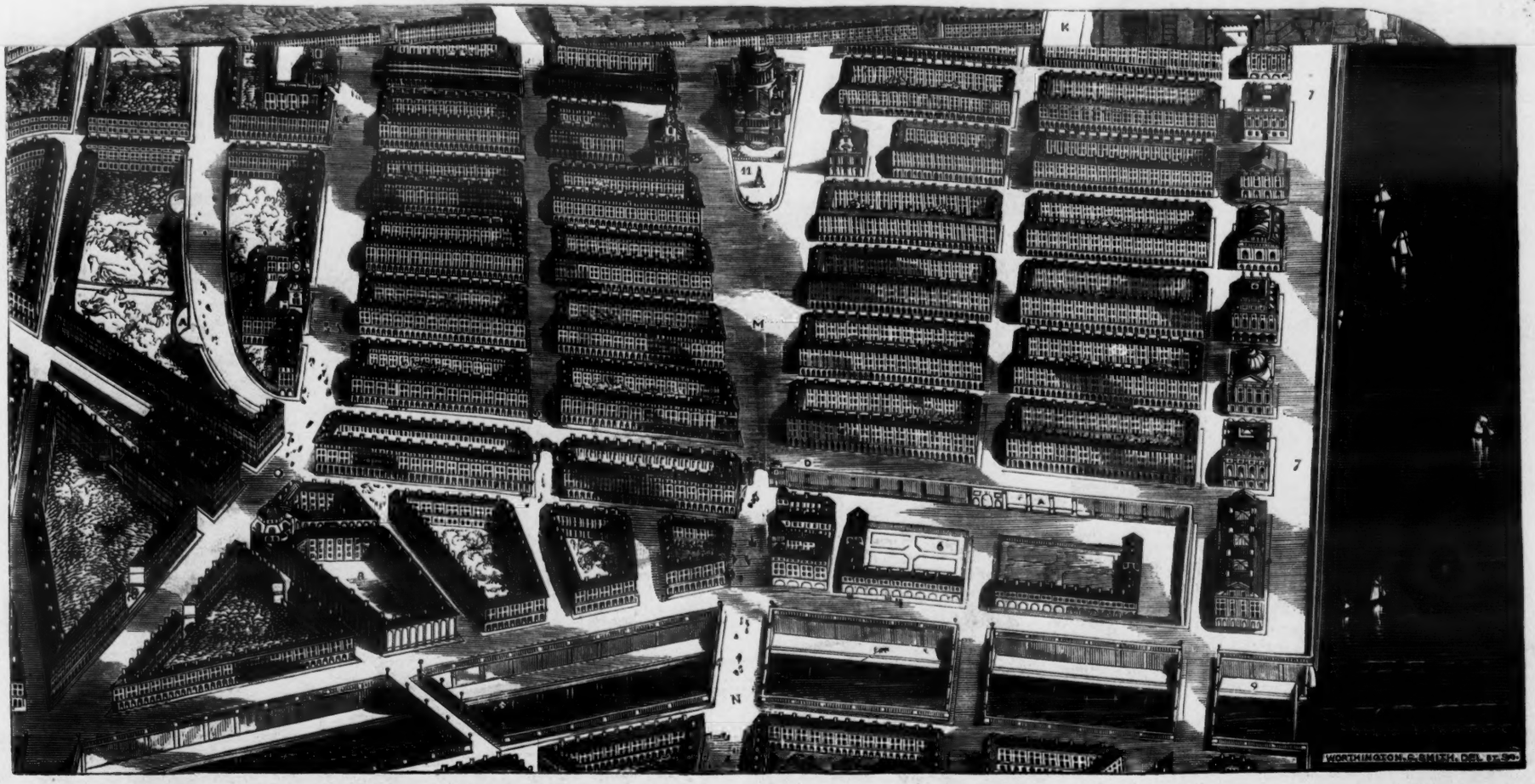
That the best means of preventing such accidents, by better applications of supplies of water for cleansing the streets, are the same that are needed for the better protection of life and property from fire in houses;

That the economical and efficent application of art and scientific means of relief is frustrated by the conditions of the fragmentary areas of independent, obscure, and virtually irresponsible local administrations, under which the metropolis is placed; which give, for example, one main thoroughfare from east to west to fourteen vestries or independent authorities, of which the Corporation is only one, and another line from north to south to thirteen parishes, each being charged with only one mile of the line; which divide some streets longitudinally between different parishes, one cleansing or paving the street at one time, and one at another, in a manner detrimental to both; and

That the first and essential step to any effective and economical improvement is to get rid of these disorderly and discreditable administative conditions—which exist at the expense of life and limb, and health, and comfort of the population, and the freedom of traffic of the metropolis,—and to place the whole area under unity of administration by a specially competent and responsible authority;

That the attention of her Majesty's Government be solicited to these conclusions and to direct a more full examination of the facts on which they are based.

Unity of administration is the declared object of the agitation for a metropolitan municipality, which it may be assumed would include the administration of the roads. Without entering into that question, there can be little doubt that several years—four at the least—must elapse before that object could be obtained, and so large a body be got into working order. Such delay, it appears to us, would be unnecessary and injurious, and that a special provincial commission, or general metropolitan road trust, properly constituted, and giving its individual attention as it ought to the service, might get the streets in a fitting condition without the sacrifice of health, waste of life and property, and perpetual fatigue and annoyance. Any such general organisation as that contemplated could be reasonably expected to be constituted long before that time."



A VISION OF THE CITY OF LONDON, CONSTRUCTED ON THE PLAN LEFT BY SIR CHRISTOPHER WREN.

Drawn and Engraved by MR. WORTHINGTON G. SMITH, *under the Direction of* MR. GODWIN.

Streets.

A A A. Old London Wall. B. Cheapside. C. Cannon-street.
D. Farringdon-street. E. Barbican. F. Bishopsgate-street.
G. Cripplegate. H. Moorgate-street. I. Holborn.
J. Leadenhall-street. K. Tower-hill. L. London-bridge.
M. Ludgate-hill. N. Fleet-street. O. Newgate-st. P. Aldgate.

Public Buildings, &c.

Q. Tower. R. Trinity House. S. Custom House. T. Billingsgate.
U. Bank. V. Mint. W. Post Office. X. Goldsmiths' Hall.
Y. Post Office. Z. Excise. 1. Insurance. 2. Royal Exchange.
3. Monument. 4. Guildhall. 5. Market. 6. Wood-market.
7. Public Halls. 8. Newgate Prison. 9. Bridewell Dock. 10. Queenhithe.

Churches.

11. St. Paul's Cathedral. 12. St. Benet's. 13. St. Clement's.
14. St. Margaret's, Fenchurch-st. 15. St. Michael's, Cornhill. 16. St. Mary Woolnoth.
17. St. Botolph's. 18. St. Stephen's, Walbrook. 19. St. Mildred the Virgin.
20. St. Margaret's. 21. St. Stephen's, Coleman-st. 22. St. Alban's, Wood-st.
23 St. Lawrence, Jewry. 24. St. Mary-le-bow. 25. St. Martin's, Ludgate-hill.

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ON BUILDING IN CONCRETE.*

CONCRETE is composed of two distinct kinds of material.

1. The aggregate to be concreted or held together.

2. The matrix, or cementing material, mixed with the aggregate to hold the whole together in the homogeneous state called concrete.

The second is evidently the most essential and important, and there is no known material so valuable for this purpose as Portland cement.

Besides Portland cement, there are other valuable cementing materials. Lias and other hydraulic limes have been much used for foundation concrete, and even for building walls, but their use for this latter purpose has always been limited, and in modern times has almost ceased, because of the length of time required for setting and gaining strength. But the recent large increase in the cost of Portland cement led to experiments, and to the use of the best limes for wall-building concretes, with greater success than hitherto.

Selenitic cement prepared from lias and other hydraulic limes used together with a small proportion of Portland cement, has been found to make good wall-building concrete at a cheaper rate, and almost as quick setting, strong, and good in other respects as entire Portland cement concrete.

In districts where the best lias is found, it has been used without the selenitic process; but, together with Portland cement, producing very strong, excellent, and cheap walls. But the use of these limes in combination with Portland cement should only be attempted by those who thoroughly understand and know chemically and practically the exact conditions, proportions, and application necessary for successful use.

Portland cement, however, is now so well and honestly made, by so many good manufacturing firms, is so easily tested, and its correct treatment and use are so well and widely known,—and there is, besides, such a wide margin of strength in its favour, as commonly applied in concrete building,—that only ordinary care and intelligence are required to ensure success in its use for all purposes of concrete building.

The various well-known mechanical and chemical tests are very valuable when it is required to ascertain the exact strength and qualities of a sample of cement for a certain special purpose, or to prove a suspected cement. The best and most easily applied working test is to make up into concrete, in the proportions that are to be used in the actual work, some of the cement and aggregate that are upon the site for use. A few hours are enough to enable an experienced workman to detect if anything is wrong in the mixture, and if any defect is suspected the cement should at once be subjected to the usual mechanical and chemical tests. But at least a week is required for these rough concrete test blocks to prove to engineer, architect, or employer that the concrete is quite good and dependable, and in the meantime the blocks should not be handled or disturbed in any way. Much harm is done, time wasted, and annoyance caused by the habit of inexperienced persons in picking and poking at cement samples before they have had time to get strength. To such persons quick-setting, light-weight cements would appear to promise good results; but it is now well known by every one practically acquainted with the use of cement, that the well-burned, heavy, finely-ground, slow-setting cements are the best for concrete purposes.

Respecting the mechanical tests of neat cement, it has been found that some of these showing the highest results when tested for resistance to tensile and transverse breakage strains, have shown very inferior results when made into concrete, and tested for the same strains in comparison with cements that gave inferior results when tested neat, but which proved very superior in concrete. Neat cement reaches its full strength in a much shorter time than a mixture of cement and sand, or gravel. Simultaneous tests, with varying proportions, show in favour of the largest proportion of cement, but the concrete mixtures gradually gain upon the neat cement, and ultimately reach and even surpass it in strength.

The aggregates useful for making concrete are very various, and easily obtainable in almost every locality. The economy of concrete is chiefly due to the facility it gives for utilising almost whatever material can be most easily obtained, and to the fact that some of the best concrete aggregates are mere waste, useless for any other purpose, or even troublesome and expensive to dispose of.

Pit and river gravels, with their coarse sands, beach shingle and sand, burnt clay ballast, broken stone, quarry waste, flints or pebbles, broken bricks, tiles, and waste pottery ware, broken slag, clinkers, and mill cinders,—all of these have been largely used, severely tested, and fully proved to be fit materials for making good, substantial walls, floors, roofs, and stairs. The best aggregates are those which can be most readily made into a concrete resembling in texture and structure the natural conglomerate stones,—that is, it should be of all sizes and forms, angular and coarse fractured, so as to fit well together, and having all spaces between large pieces filled with smaller particles, and leaving no interstices.

The materials most readily fulfilling these conditions are old bricks, tiles, and pottery, rock and quarry refuse, slag and clinkers all broken by Drake's patent stone-breaker, which, having been designed expressly for this purpose, produces fragments of various sizes from about 1½ inch cubes down to particles the size of coarse sand. With this material only a *minimum* of cement is required, sufficient to form a thin coating around every particle, and give continuous adhesion, thus making the strongest possible concrete without waste of cement, and leaving no interstices for percolation of water through the concrete.

Old pottery and tiles and vitrified fire-bricks, old building bricks, and stones that break with rough fractures, make the strongest concrete, as broken, proved by Mr. Grant's, Mr. Kircaldy's, and numerous other tests.

Flints and other stones breaking with smooth fractures, and also slag, make concrete a little strong, but still stronger than rounded gravel concrete. A fragmentary slag is produced at the Middlesbrough iron work, by running the molten slag as it leaves the furnaces on to revolving discs, upon which jets of water play, thus causing the slag to break up into small pieces about the size of almonds and Spanish nuts. With this fragmentary slag, we have constructed some of the most satisfactory concrete buildings yet done. New master's houses at Marlborough College (Mr. Street, architect) were built with broken flint, concrete, and lump chalk packing. Many stones too soft and liable to decay, if used as ordinary building-stones, make excellent concrete, the cement protecting them from the influence of weather; and many of them containing metallic oxides and large proportions of soluble silica appear to unite chemically with the cement and form almost indestructible hydro-silicates.

Next in order of merit, after broken bricks, I place burnt clay ballast. It has the same advantages of tough surfaces, absorbent nature and variety in sizes; but before using this material it is necessary to prove that it is thoroughly well burnt. Stiff clays may be burnt with about five pecks of coal to the yard cube of ballast; but light, loose, and shaley clays require more coal; some can hardly be burnt with double the quantity of coal. That most excellent concrete can be made with burnt clay, you can see by examining some pieces before you, which have been cut from the concrete of my house during alterations. The cost of making clay ballast is from 1s. to 2s. 6d. per cubic yard. Land, water, or sea gravels are the most extensively used of all concrete aggregates; although, for reasons stated, I hold them to be inferior to some other aggregates, they all make exceedingly good concretes.

The flat and angular land gravels, from not being so much rounded and polished by attrition, make the soundest concretes, provided they are free from loam or clay. The addition of a sufficient quantity only of clean sharp sand, to fill the spaces between the larger rounded pieces, makes the best gravel concrete; but care must be taken, that too much sand is not used, otherwise the distribution of cement is so much greater that a larger proportion is required. Care must also be taken that very fine sand be not used at all, for this is simply an adulteration of the cement, that will cause very poor concrete. Where sand cannot be easily obtained, good and strong concrete is made with round gravel only. The cement, uniting the particles of gravel only, is not diluted or over distributed by sand, but uniting the particles of gravel at their points of contact only. This kind of concrete has been proved by testing to be capable of resisting much greater crushing force than ordinary bricks. But surface cementing is necessary to prevent water from entering and running through between the particles of this kind of concrete.

Respecting every kind of aggregate it is of the greatest importance that it should be free from dirt, dust, or earthy matter of any kind, and any defects of this sort must be removed by washing.

Respecting the correct proportions for mixing, it will be seen that a considerable variation is possible, from the varying nature of the aggregates, and I have used from one-third to one-twentieth of cement, but the proportion which has been found sufficient to give a coating of cement to each particle of ordinary gravel concrete is one-eighth, and this is the proportion that is almost invariably used. For roofs, floors, stairs, and other special work, one-fifth or one-sixth cement is used, in order to induce a more rapid setting and strengthening, to ensure a thorough coating to every particle, and that there may be no unfilled spaces; one-eighth of cement is sufficient for wall building. A larger proportion may be considered waste.

A few months ago a piece of concrete was shown to me as a sample of good rich concrete. The joint of cement between the pieces of gravel was from ¼ in. to 1 in. in thickness. I could only remark that if the best concrete is a solid mass of neat cement, then the adulteration by means of gravel has not been carried to a great extent in this sample. The water used for mixing concrete should be clean. It is possible to destroy much of the strength of cement by using dirty or polluted water. Sea-water has not been found injurious, but is supposed to delay the setting. Respecting the quantity of water to be used there is more danger to be apprehended from using less than from using more than the right quantity. The correct quantity of water is of course sufficient to convert the cement into a thin paste that shall completely coat and cause to adhere all the particles of the aggregate. With absorbent aggregates extra water must be used, or the absorbent materials should be watered before mixing with cement begins. Allowance must be made for evaporation in hot weather.

I have seen concrete that had apparently sufficient water when mixed utterly spoiled by rapid evaporation under a hot sun. Unless so much water were used as to wash away the cement, or make it so thin as to cause it to run through the aggregate (which is almost too absurd to consider possible with some workmen), the only danger from too much water is to delay the setting, because the cement must first exude the excess of water not required for hydration. I prefer concrete mixed by hand, as it is important to have the materials all mixed dry before mixing with water. Crystallisation or setting begins at once with the addition of the water, and as little time as possible spent in thoroughly mixing and placing into the mould or apparatus after water has been added. There are many various concrete-mixing machines, most of them being unnecessarily complicated, the best being a plain revolving cylinder working horizontally. Concrete mixed in machines is generally over-mixed after the addition of water. For the same reason that the concrete should be at rest, in the place it is to occupy permanently, as soon as possible after mixing, no ramming should be allowed. At once on being placed into the mould it should be prodded and compacted to the surfaces, around and between packings, around flues, &c., and should then be left undisturbed to take full advantage of the setting powers of the cement. Where ramming is used, not only is the setting interfered with, but the adhesion is destroyed, of the comparatively new concrete.

There remains one other point to notice respecting materials, viz., "packing" or "core-filling." This consists in the placing of large pieces of hard materials—stones, slag, old brick, &c., into the midst of the concrete in the walls when building. The object of using packing is economy. In walls made of concrete only, the proportion of cement to the whole bulk of the wall is one-eighth. But in a packed wall, where, say, one-third of the more costly concrete is dispensed with by packing, the proportion of cement to the bulk of walling is reduced to one-twelfth. There is also economy in labour; the quantity of mixed concrete being less, very little care is required in the use of packing to ensure as firm adhesion between the packing and concrete as between the particles in the concrete itself. It is probable that in a thick wall with packing the concrete sets and hardens sooner than if the wall were all concrete.

* From a paper by Mr. Charles Drake. Read at a meeting of the Civil and Mechanical Engineers' Society.

The care required in the use of packing consists in having it free from dust and dirt, and when absorbent materials, such as old bricks, are used, these must be made damp enough to secure adhesion, otherwise the dry packing will absorb moisture from the adjoining concrete, and thus prevent adhesion, and weaken the concrete. Care should also be taken to place the pieces of packing at least 1½ in. apart and in from the face of the wall, so that each piece shall be surrounded and made to adhere to each other by concrete. The perfect adhesion between packing and concrete and the strength of packed walls have been abundantly tested and proved, and I presume it is not necessary to occupy time in stating cases.*

LIBELS UPON CONCRETE BUILDING.

SIR,—In the *Builder* of the 12th ult. a report is given of a discussion at the Institute of Architects containing statements so entirely misleading and calculated to injuriously affect a successful and deserving business, that I beg you will allow me, in the interests of truth and justice, to challenge some of the statements reported:—

Mr. Aitchison is reported to have said:—"With regard to concrete walls they are apt to split perpendicularly, and great fissures are thereby caused; they also shrank very much."

I desire most distinctly to challenge both these statements, and deny that any proof whatever can be given to support them. During eight years past I have carefully watched the construction of several hundreds of concrete buildings, and have examined every concrete building, old or new, that I could hear of, and I have never seen a crack that could, without a wild stretch of imagination, be called a great fissure.

I have seen great fissures in brick and stone walls caused by shrinkage of stiff clay subsoil, and by settlements of heavy stonework, where sufficient concrete foundations have not been laid, and I have seen a very few small cracks in concrete walls, but certainly smaller in number and degree than is the general case with stone or brick walls, and the few cracks I have seen have all been easily traceable to defective foundations, construction, materials, or workmanship; and although I have heard a shrinkage asserted, I have never seen or heard the smallest reason or proof for such a theory.

Often a small settlement will be unseen in brick or stone walls, through being distributed over a considerable area, a great number of joints giving away, each a little, but without a crack showing. The same settlement occurring in a concrete building would most likely be concentrated at one point; and there a crack would appear, but the stability of the structure would no more be affected in one case than in the other.

Mr. MacVicar Anderson "did not think it was possible to make concrete withstand water," and some other speakers, appear to have agreed in this opinion. Upon this point permit me to quote from a paper of mine already published:—

"5th. The non-absorbent qualities of concrete are considered by many to be its most valuable quality. Good cement concrete is practically damp proof. The best proof I can give of this is to refer to the owners of the numerous houses that have been built under my patent during the last six years. In September last Lord Ashburton's clerk of works, writing of his five years' experience of concrete houses built with our apparatus, said, 'Lord Ashburton is much pleased with his concrete buildings; in fact, among all the new ones, they are the only ones that keep out the wet. In many concrete buildings the cisterns are formed over outbuildings, by carrying the side walls a few feet higher, the bottom of the cistern being the same piece of concrete that forms the ceiling of the room under the cistern; the only thing necessary to render the concrete absolutely watertight being to lay on one coat of Portland cement trowelled smooth. Flat roofs and roofs of bay windows are made perfectly watertight in this way. However, it must not be considered that the various rough concretes used for wall building will ensure a perfectly dry building without cementing the surface. In the majority of cases it will do so, but sometimes rough rounded aggregates are used that produce strong good walls with good key to take surface cementing, but having small interstices through which water would find its way if the surface were not cemented. This, however, does not alter the fact of the non-absorbency of concrete walls."

I have lived in a concrete house where the concrete bottom of the cistern formed the ceiling of the closet under, and where the concrete roofs over bay windows formed parts of the ceilings of drawing and dining rooms. I have seen water running over the tops of parapet walls of the bay windows (through stoppage of the rain-water pipes) but no dampness has appeared.

It is doubtless possible to build concrete walls that will not keep out water, but these are the very rare exceptions, and may in every case be accounted for as already shown, or by bad cement or workmanship.

To many architects these facts are well known and appreciated, but my complaint is against those who invent theories of their own, without practical knowledge; who make general statements based on isolated facts capable of widely different explanation; who dogmatise and lay down as rules matters which are the merest exceptions. And others, worse, who, fearing to grapple with the requirements of a new material or method, endeavour to put it aside by inventing defects for it, or by seizing or magnifying small defects, to which other systems are equally or more liable, but which in these other systems are considered venial, and matters of course.

Respecting the capacities of concrete for building purposes, the samples for testing exist in hundreds of buildings in all parts of the United Kingdom erected under my patent during the last seven or eight years, and in a paper read only a week ago, and which I hope to see published in the *Builder*, I have made statements which are not mere matters of opinion or theory, but which are capable of the practical test of works done and extant. If my statements are true they are worthy of the consideration of the architectural profession. If untrue they deserve to be exposed at once, because concrete buildings are making converts rapidly. All I ask for it is thorough and impartial examination. CHARLES DRAKE.

* To be continued.

TIVERTON SANITARY AFFAIRS.

SIR,—The following is an extract from the *Devon Weekly Times*, Sept. 5, 1874, containing the result of an advertisement inserted by the town council of Tiverton, in the *Builder* twice, and in certain West of England papers three weeks.

If this is the manner in which the duly-qualified sanitary inspectors under the Sanitary Acts are appointed, how need you wonder at the state of affairs there? Furthermore are added the duties of borough surveyor, which contain the superintendence and maintenance of ninety miles of streets and roads, and all for the large salary of 80*l.* per annum.

This is not sufficient, but this energetic ex-councilman has been allowed to employ a deputy at 70*l.*, to perform his arduous duties.

This is a novel way of retiring from town councils; and if such is the way in which the Sanitary Authority of Tiverton manage, we need not wonder if the people are killed.

PRO BONO PUBLICO.

"A special meeting of the Town Council was held on Wednesday. Applications for the office of borough surveyor and nuisance inspector, fifty-one in number, were opened; and Mr. Besley, a member of the Council, who for the last year has gratuitously fulfilled the duties of Surveyor, was appointed at a salary of 80*l.* per annum. Previous to the appointment Mr. Besley, resigned the office of councillor, and paid the fine of 30*l.*, incurred by such resignation. A motion was afterwards carried to remit the fine, if possible, and Mr. Besley was informed that his duties would commence at Michaelmas next. Mr. Crabbe preferred a claim for compensation on account of being deprived of the office of inspector of nuisances, for which he had latterly received 15*l.* per annum, and he was instructed to bring his claim before the next meeting of the Finance Committee."

CONSTANT AND INTERMITTENT WATER SUPPLY.

THE Whitechapel medical officer of health, Mr. John Liddle, in his last quarterly report, says:—"I can state that a very large number of houses, and nearly the whole of the courts, on the north side of Whitechapel, which are in the district of the East London Company, are now supplied with water upon the constant service; and I am informed that the whole of the houses, with the exception of those from the east of Baker's-row to the boundary of this district, will be so supplied by the end of the summer; but I regret that I cannot report so favourably of the progress made in the extension of the constant service by the New River Company; for in Love-court, Whitechapel, in which there are thirty-eight houses, thirty-three of them are supplied with water by the New River Company, and five by the East London. Those houses which are supplied by the New River have an intermittent supply, while those supplied by the East London are upon the constant service. The New River Company having cut off the supply of water to the houses numbered 1, 2, 3, 4, Love-court, owing to the fittings being defective, they informed me of the fact, when I immediately directed the inspector to serve a notice on the owner to forthwith reconnect the pipes and put up proper fittings, or proceedings would be taken under the provisions of the Nuisances Removal Act to compel him to supply the houses with water. In this instance the company, instead of insisting that the fittings should be made suitable for receiving water on the constant service, directed that cisterns should be erected, and the houses are again supplied on the intermittent service; although the owner stated that he was anxious to have the water on the constant service, in a similar manner to that of his two other houses, Nos. 5 and 6, in the same court, which are supplied by the East London Company. The New River Company, however, declined to accede to his request; and their officer, when spoken to by your inspector on this and some other cases, said that the company were unwilling to put the owners of *such* property to the expense of so altering their fittings as to adapt them for the reception of water on the constant service. If this statement be confirmed by the directors of the company I shall be sorry for it; for, in my opinion, it is just this kind of property which should be supplied with water direct from the main, without the intervention of butts or cisterns. The water companies have the power, under the seventh section of the Water Act, to supply all the houses in their respective districts with water on the constant service, which, in crowded neighbourhoods, ought to be done; for the appearance of the water which is usually found in the receptacles now in use in such localities is repulsive, and is unfit for dietetic purposes. I suppose there can be no difficulty on the part of the New River Company supplying all the houses in their district with water on the constant service; for it appears from the observations of Mr. Baxter, who attended with a deputation of the Metropolitan Water Companies to the Local Government Board, that the companies would do so, as soon as the houses were ready to receive water on the constant service. If, however, they wait until the houses are made ready for that purpose by the voluntary act of the owners of tenements, it will be a long time before such a plan is carried out. So fearful are the New River Company of the poor inhabitants wasting water, when supplied on the constant service, that they do not afford them a sufficient supply for domestic use; for the company have determined to permit only a recently-invented apparatus to be erected, which in several cases does not allow more than a quart to flow at each turning of the key, and sometimes not even that. From the experience I have had in this matter, I am decidedly of opinion that unless the pressure of public opinion be put on the New River Company to furnish water on the constant service, and then to give a better supply, such as can be obtained by the use of the screw-down tap, which is really the best, and I believe the cheapest contrivance, the complaints of the poor will become more general. It is really most disheartening to see how our efforts to obtain water on the constant service in the poor localities of this district are thwarted by the New River Company."

APROPOS OF COSTUME.

IN the course of our article in last number, suggested by the new "Cyclopædia of Costume," we recommended more attention, on the part of ladies who desired to dress tastefully, to the artistic combinations to be attained, in regard to colour as well as form, from what it is the fashion to consider as the commoner materials of dress. From a paragraph in the *Pall Mall Galette* of the same date as our remarks, it would seem that in Paris dress fashions are just taking that very course, in rather too decisive a manner. We read that, to reach the height of Parisian elegance at present, "it is necessary to have something quite new, and, novelty thus taking the *pas* of all other considerations, an ordinary material may be found to render good service and be as capable of affording an eccentric combination as the most expensive and delicate fabric. There is a rush for 'sensational costumes,' and these, it is stated, may be made of linen or barège, as well as China crape or satin. Even some of the 'most elegant chapeaux' are made of the commonest kind of plaited grass and straw. The Parisian dressmakers justly argue that when *grandes dames* adopt the peasant apron or the shepherdess hat, there is no reason

why they should not borrow also the fabric of which they are made."

It need hardly be said that what we wished to see was not what could be described as "sensational" costume; but that an attempt to make an artistic use of materials of less sumptuous description might be attended with much more pleasing results than an extravagant expenditure for rich materials, merely on their own account. The fact that fashionable Paris is, apparently, giving its approval to this use of plainer materials even for the best dresses, is a sort of corroboration of the opinion we expressed, though, unfortunately, Paris goes about it in the wrong spirit. The desire for sensation and novelty, merely for the sake of novelty, is just what a true taste would tend to suppress. Another feature of the Paris movement is still more characteristic:—"It must not be thought that this eccentric simplicity brings financial relief to the husbands of the *grandes dames*. The dressmakers charge nearly, if not quite, as much for a toilette, of whatever it may be composed, and therefore lose nothing, but on the contrary gain much, by the simple tastes of their customers."

That is the result when such things are governed merely by fashion, or the desire to out-do one's neighbours, instead of by the cultivation of an individual taste on genuine grounds. Fashion is always costly; good taste need by no means be so.

THE NEW BANK PREMISES IN PETERBOROUGH.

THE Stamford, Spalding, Boston, and Peterborough Bank, in Church-street, in this city, is near completion. It is a two-story building, of Ancaster stone front and return angle. The ground floor comprises eight semicircular windows, divided by deep rusticated piers, enriched caps, with bold architraves round the head, terminating in enriched cusps, the spandrels between having basso-relieved foliage. The plinth and base mouldings are of deep finely-tooled grey Aberdeen granite, with Ancaster stone panels and sunk picked faces; the piers having large deep flutes, raised on stile. The string-course and window-sills are of moulded Aberdeen grey granite. The eight windows lighting the bank and manager's rooms will each consist of one pane of British plate-glass, 9 ft. 6 in. by 4 ft. 6 in.; the lower portion of it will be embossed with the name of the banking company. The bank-room, one large compartment, 35 ft. 6 in. deep by 27 ft. 6 in. wide, is approached through a spacious doorway, the jambs being deeply coved and moulded, polished, red granite, with mahogany swing-doors at the entrance. The floor consists of encaustic tiles in front of the counter. The building is warmed by hot-water pipes. The manager's room, 15 ft. high, 25 ft. by 15 ft., faces the street. The waiting and book rooms, not omitting the strong-room, which is enclosed with strong walls, and arched with brick and fire-brick, with the lavatories and retiring-places for clerks, are placed at the back. Mr. Nightingale, of the Albert Works, London, is the contractor; the architect being Mr. Eve, of London. The clerk of the works is Mr. Jno. Duncan. The carving is from the hands of Mr. Matthews, of Grantham.

QUESTION AS TO "CUSTOM" IN THE BUILDING TRADE.

BARKER *v.* CULLUM AND OTHERS.

THIS was an action in the Clerkenwell County Court last week to recover the sum of 2s. 7½d., balance of wages due. Mr. Boydell appeared for the plaintiff, and said that although the amount was small, yet the question involved was one as to the "Trade's custom."

The plaintiff said that he was a bricklayer, and had worked for defendants for about nine weeks. He had absented himself during Whitsun week, excepting on the Saturday, when he returned to his work at six o'clock in the morning and worked till eight o'clock, when the foreman told him that his master had given orders that he (the plaintiff) should not be taken on again. He did not resume his work, but requested to be paid for the time he had worked, when the foreman replied that he could not pay him as he had not any money, but that he must wait. He was paid 9d. an hour, and at twelve o'clock, when the other men were paid, he was paid up to eight o'clock and not up to twelve. It was, he said, the custom of the trade when a man was discharged to pay him there and then, or to receive an order to fetch the money, and charging what is called "receive money" time. Plaintiff waited till twelve o'clock, and when the foreman settled with him for the two hours he asked for some remuneration for the time he had been kept waiting, but the foreman declined giving him any remuneration.

Evidence on both sides having been given,—

The judge said that the plaintiff, after working for two hours, was discharged, and when he asked for his money, he was told to wait till twelve o'clock. However wrong the plaintiff may have been in not returning to work during the whole of the week, it had nothing to do with the case, and therefore he considered that he was entitled to the 2s. 7½d.,—it was the custom of the trade. If he had been informed of his dismissal prior to beginning to work, the case would have been different.—Judgment accordingly.

CHARING CROSS APPROACH TO THE EMBANKMENT.

AT the meeting of the Board of Works last week, tenders were received from the following firms for the formation of the Charing-cross approach, the amounts of the respective tenders being as stated, viz.:—

Wigmore & Co.	£24,700	0	0
Stevens & Co.	24,000	0	0
Turner	22,500	0	0
Butterein & Co.	21,750	0	0
Webster	21,600	0	0
Downs & Co.	20,399	0	0
Nowell & Robson	19,950	0	0
Pearson	19,099	0	0
Jay	18,900	0	0
Carey	18,000	0	0
Williams	16,953	0	0
Oliver	16,900	0	0
Perry & Co.	16,800	0	0
E. & H. Beaver	16,750	0	0
Mowlem & Co.	15,750	0	0

On the motion of Mr. Richardson, seconded by Mr. Freeman, Messrs. Mowlem & Co.'s tender was accepted.

CHARING-CROSS AND THE EMBANKMENT.

SIR,—I have been a constant reader of the *Builder* since the first number, and always look to it for early information relative to the improvements in London. There is a great improvement about to be commenced at a large cost, viz., the new street through Northumberland House gardens, of which some information is needed. In the Act enabling the Duke of Northumberland to sell his house, there was a clause inserted that all plans should be submitted to "the Royal Institute of British Architects." I do not know whether this would include a plan for "laying out" the street. The tenders for the formation of the roadway ranged from 24,700*l.*! to 15,750*l.*! This difference, to an outsider like myself, is quite incomprehensible. Are we to conclude that the tender of Messrs. Mowlems,—which was accepted,—means that the street is to be pitched with granite? I hope not. But it is of the greatest importance,—as to the beauty of the proposed street,—that the direction it takes should be the right one, and of this the public have had no intimation. If it be placed in a direct line with Cockspur-street, then the north traffic,—from St. Martin's-lane,—will not reach it, or the traffic from Piccadilly and Leicester-square through the new street I hope to see before long from Leicester-square to King William-street, as first suggested, I think, by the *Builder*. Drivers will not turn back to get into the new street; and the uniformity, such as it is, of Trafalgar-square will be much interfered with. When we consider what this street will cost, I think the public should have ample notice of these matters,—the cost will come entirely out of the pockets of the London ratepayers.

The street is to be 90 ft. wide (10 ft. less in width than the Embankment) and about 900 ft. long, and to cost just upon 16,000*l.* for the "roadway" alone. The Duke of Northumberland received 500,000*l.*, and other property and interests will cost probably, with Messrs. Mowlems' bill, 50,000*l.* more. The old materials will barely realise 7,000*l.* Suppose there are 100 sites for building let at, say, 100*l.* a year each ground-rent, making 10,000*l.* a year,—at thirty years' purchase, these may produce 300,000*l.*,—the street even then will cost at least 300,000*l.*: so it ought to be "an ornament" to London.

IGNORAMUS.

Proposed Addition to Mitcham Parochial School.—At the meeting of the Holborn Guardians on the 23rd ult., plans of the proposed two additional wings to the schools at Mitcham, to serve as probationary wards for fourteen children, at an estimated cost of 650*l.*, and of the arrangements for converting the infants' school, at an estimated cost of 2,500*l.*, were submitted by Mr. Snell, the architect. After some discussion as to the cost, it was resolved to refer the plans to the School Committee for consideration, and that Mr. Snell be requested to attend.

PETER THE GREAT'S "FURNITURE."

IT may interest some of our readers to know that there is now "on view" in London some noteworthy articles of furniture, said to have formerly belonged to the great Czar, Peter of Russia. They consist of a *sideboard*, fully carved, partly, as affirmed, by the great Czar himself; a *bookcase*, and an *iron chest*. These are now the property of a Russian nobleman, M. Gregorio Ischertkoff. They are further noteworthy from the fact of a *notice* of them which appeared in the *London Gazette* of Monday, February 6th, 1698. They afford a glimpse into the way of life of the great Czar, and are worth a visit. They are now, for a time, at 39, Great Russell-street, Bloomsbury, previously to their removal to St. Petersburg.

AT THE SOIRÉE.

DEAR MR. EDITOR,—Do you know Edwin took me last week to the Annual *Soirée* of the Architects, "to introduce me to the profession," as he said; but that was a joke, you know. Only, you see, I am just married to Edwin, who papa says is one of the most rising young architects in the profession (and I am sure he must be, because, do you know, the other day his design for the new church in our neighbourhood was picked out as the best out of *ever* so many others, some of them by very distinguished architects; papa was chairman of the committee, so he knew all about it); and so he thought I should like to go with him to the professional entertainment. And it was all very nice, and we found things to look at, pictures and sideboards, you know, and large jars, and Japanese embroidery (Oh, those dear Japanese!), and one or two designs by Edwin himself, which I thought beautiful; and it was so interesting, you know, all the heads of the profession being there, to see the celebrated architect who restored my uncle the Archdeacon's church so beautifully,—Oh! so that you would never have known it again,—and the clever man who is going to turn that shabby old St. Paul's inside out, and make it all as handsome as can be; and all those sort of people. Only I must say I do not think the architects' wives seem to dress in any better taste than other people, as I should have thought they would. However, I was going to tell you, that after looking at the things upstairs a little, we heard there was to be music downstairs, and as I am very fond of music, we went down; and there, instead of anything nice to listen to, there was a regimental band in the middle of the room, playing so loud, close to one's ears, and playing just the same sort of things that they play in the parks and in the squares for the nursery-maids to listen to. Really, you know, I began to feel quite vulgar, as if I was a crowd in the park. And it seems to me if the architects, who are artistic people, give an evening party, they should do it in the same way that other artistic people would. I am sure Lady Satsuma Ware, who has such a mania for old china, and gives what Edwin calls "æsthetic" parties (I do not know what that means, but I hope it is not slang), would never have a brass band in to play polkas, and whatever other trash they liked, for her guests to listen to. And Edwin says he saw in the *Builder* that when the French architects had a dinner together the other day, they had a nice little concert, all properly arranged, and with superior performers, afterwards, so that people could listen to it like sensible beings, and have something worth listening to. And why can't they do that at the architects' *soirées* here; and have a little singing or playing that one would enjoy listening to, when people had done walking about and talking, instead of having a band making such a noise you can't hear yourself speak, and all about such a wretched selection, you know?

To be sure, dear Edwin says many of the visitors there would not care for anything better. Poor things! But that *can't* be true, can it?

ANGELINA.

Dover Pier and Harbour Bill.—In reply to Mr. Freshfield, on the 25th ult. in the House of Commons, Sir C. Adderley said the strong expression of the Committee upon the Dover Pier and Harbour Bill rendered it necessary for Her Majesty's Government to reconsider the whole plan. At the present period of the session it was impossible to do so, but it would be considered during the recess and brought up next session.

DISCHARGE WITHOUT NOTICE.

WATTS *v.* CROKAM.

THIS was a claim in the County Court, Bridport, for 3*l.* 7*s.* 8*d.* Plaintiff said he was written to by defendant as to taking a situation, his duties being to superintend the laying of the pipes in connexion with the waterworks at Litton, Dorchester. He (plaintiff) was in London at the time, and he wrote, sending testimonials, &c., and subsequently agreed to go at 38*s.* per week. The amount claimed was for a week's wages and his expenses from London when he accepted the situation. He had been discharged without any notice, and that was the reason he sued for a week's wages.

Defendant, who was the contractor for the Bridport waterworks, said the plaintiff was employed by him as a skilled workman, and not as foreman, and was in his service from the 27th of March till 12th of May. On the 13th of April at the works at Coombe he noticed that the plaintiff was very slow at his work, and told him so; and plaintiff replied, "If that is the case I can go." He had been a contractor for fifteen years, and it was his opinion that plaintiff was not competent to do the work he undertook.

The Judge said it appeared to him that the plaintiff having been employed so long as he was, showed that he was not so incompetent as was attempted to be made out. The issue turned on as to whether the plaintiff ought to have had notice; he (his Honour) considered he ought, and he should give judgment for the week's wages, 38*s.*, claimed, but he could not allow the amount claimed for plaintiff's journey from London when he undertook the work.

Plaintiff said he had come down from London on purpose to be present that day.

The Judge allowed 2*l.* for plaintiff's expenses, and also the cost of a witness from Salwayash.

SCHOOL BOARD SCHOOLS.

Irthington. — Lately, Mrs. Dacre, of the Glebe, Irthington, laid the foundation-stone of a new school and schoolmaster's residence to be erected by the School Board at Irthington. The school has been designed by, and will be erected under the supervision of, Mr. John Stewart, architect, Carlisle; and will accommodate 120 children. The contracts for the several works are undertaken as follows: — Masons' work, Mr. Robert Irving, Newtown; joiners' work, Mr. Burgess, Laversdale; slating, Mr. Bell, Irthington; plumbing, Mr. Johnstone, Carlisle; painting, Mr. B. Slee, Carlisle. The estimated cost is 1,200*l.*

Wrexham.—The first of the new schools in course of erection by the Bersham United District School Board, viz., Tabor-hill Infants' Schools, is now completed, and is temporarily used by the girls during the time occupied by considerable additions being made to existing schools. The building is of Pen-y-Gelli freestone, and consists of schoolroom and two classrooms, with a floor area of 2,460 superficial feet. The architect is Mr. W. Turner, of Wrexham; and the contractor, Mr. Sept. A. Clark, of Denbigh. The cost, exclusive of site, has been about 1,500*l.* The accommodation is for 315 infants.

CHURCH-BUILDING NEWS.

Stutton.—In 1862 this church was restored and enlarged by the rector, the Rev. Thomas Mills, at an expense of about 700*l.* Towards the end of last autumn some ominous cracks made their appearance in the walls of the chancel, and an examination showed that the structure had become unsafe. The venerable rector at once determined to rebuild the chancel, and to enlarge the church by the addition of a north chapel or chancel aisle, opening on the west to the new transept, and on the south to the chancel. The arches by which the chancel aisle communicates with the transept and the chancel are new; they spring from corbels carved to represent foliage. The Perpendicular window which formerly occupied the east gable of the chancel is now placed in a corresponding position in the chancel aisle; it is filled with stained glass, by Clutterbuck, and represents the rCucifixion. The chancel chapel is furnished with five long open benches stained and varnished in character with those in the nave, and having poppy-heads. These give additional accommodation of fifty sittings. The walls of the chancel are faced externally with flint pebbles, with stone quoins, and internally are stuccoed; the roof is of pitch pine, in three bays, and has been executed by Mr. Wagstaff, builder, Freston, who has also carried out the other work of the restoration, with the exception of the stone-work, which has been executed by Mr. Chinnock, Ipswich. The new east window is the work of Messrs. Hughes & Ward. The tiles within the communion-rails were supplied by Messrs. Malkin, Edge, & Co., Newport Tile Works, Burslem. The rest of the chancel is paved with tiles from Messrs. Minton, Hollings, & Co. The restoration has been carried out under the superintendence of the Rev. W. F. Francis, curate of Great Saxham; and the cost, amounting to about 1,200*l.*, is wholly borne by the rector.

Brighton.—Under the title of St. Luke's Church, the building in Prestonville-road, known by the name of Prestonville Church, has been opened. The site of the new church is at the point where Prestonville-road bisects the Old Shoreham-road, which, previously to the construction of the present brick and stone building, was occupied by an iron church. Although erected for temporary purposes, that edifice had a short career; for some children who were amusing themselves with matches in the field outside the church, set it on fire, and it was utterly ruined. Unappalled by this casualty, the Rev. Mr. Robinson set on foot a project for a new building of a permanent character, and steps towards the construction of the present edifice were taken. The work proceeded briskly up to a certain point, and the major portion of the main building was erected, when financial difficulties put a stop to it. After various other obstructions, a committee was formed, and the church completed. It is built of brick and stone, with a slated roof, and an ornamental spire. A course of red bricks lines the springing of the arches, which are supported by iron columns, painted brown. There are large windows on all four sides. The artificial lighting is by gas standards. The church has three entrances, the principal one facing south, and the others east. The floor is tiled. The total accommodation, which is all on the ground-floor, is for upwards of 500 persons, the seats being open wooden pews, half to be left unappropriated. Mr. J. Hill was the architect.

Leicester.—The memorial stone of the Church of St. Saviour, now in course of erection on the Spinney Hills, the gift of the Rev. Frederick George Burnaby, formerly rector of Barlestone, was laid by the founder on the 7th of June. The edifice is being erected from designs by Sir George Gilbert Scott, R.A. The style will be Early English, of the thirteenth century, and the building will seat about 1,000 persons. It will be mainly constructed of brick, with Bath stone dressings. The plan includes a nave and chancel, 152 ft. in length by 54 ft. wide, with aisles, north and south transepts (the width across the transepts being 68 ft.), and a tower at the south-west corner, terminated by a lofty stone spire. The tower is carried up to the height of 78 ft., and the spire 72 ft., the total height to the top of the vane being over 150 ft. At the intersection of the nave, transepts, and chancel, will be a groined dome, 52 ft. high, supported upon four columns of granite from Westmoreland. The roof will be high-pitched, open, on the tie-beam principle, and constructed of stained Memel deal. The chancel roof will be groined in wood, and the apse it is proposed to dome in brick. The seats will be of stained deal, and the heating will be on the Haden principle. The ground surrounding the church, owing to its sloping position, will be arranged in terraces, the principal entrance to the building being at the west end on the St. Saviour's-road. The contracts for the building alone will amount to 11,500*l.* The contractors are Messrs. Osborne Brothers, and the clerk of the works Mr. G. Wood. In addition to the church, Mr. Burnaby intends to erect a parsonage-house and schools.

Cambridge.—The new church of St. Giles, Cambridge, has been consecrated by the Bishop of the Diocese. The accommodation in the old church, now superseded, after being used for divine worship for about eight centuries, being inadequate to the requirements of the parish, steps were taken by the late incumbent, the Rev. J. S. Jackson, and a number of the leading parishioners, to supply the defect. The new church has been erected next to Castle-street, contiguous to the old one, some small portion of the latter being incorporated with it. The style is English Gothic. The materials used are white bricks, with Doulton stone dressings, covered with Westmoreland slates. It is proposed to erect a tower when the funds permit. The structure consists of nave, aisles, chancel, north and south transepts, and open roof, boarded under the rafters. It is 113 ft. in length, by 64 ft. in width, and will accommodate about 900 persons. The seating has not yet been fitted up, and various other portions of the work remain to be finished. The cost of the building and ground is over 8,000*l.* Messrs. T. H. & F. Healey, of Bradford, are the architects, and the works have been carried out by Mr. J. Loveday, of Kibworth, Leicestershire, under the superintendence of Mr. Cooper, his clerk of works.

Taunton.—The service on the re-opening of St. James's Church tower was held on the 16th of June. The tower, which has just been rebuilt, is a reproduction of the old tower, and is faced with red sandstone, from the neighbourhood of Williton, Ham-hill stone having been used for the dressings, and Bristol Pennant for the tower steps. The tower is divided into four stages, that at the base measuring 33 ft. 6 in. from the floor to the centre piece, and it is occupied on the west side by a recessed doorway with carved foliated spandrels, and by a stained-glass window, in the fourteenth-century style of architecture, by Heaton, Butler, & Co., of London. There are two niches near the ground, one on either side of the doorway, for statues. The next two stages are nearly equal to each other in height, and are divided by a moulded string-course. Each contains a window of two lights. On the south side of the third stage are two niches, containing statues of St. James and St. Mary Magdalene, sculptured by Mr. Boulton, of Cheltenham. Above this stage is the belfry, which slightly recedes from the face of the wall, as do also the other stages below, having two windows of three lights each. Above the belfry is a bold cornice moulding, a pierced parapet, and large angle pinnacles. There is an octagonal staircase turret at the north-east angle carried up the whole height of the tower, finished with a spire, battlements, and pinnacles. The height of the tower from the ground to the top of the battlements is 105 ft., and 116 ft. to the top of the pinnacles. The walls at the base are 4½ ft. thick, and the tower is 14 ft. square within the walls. The cost has been about 4,000*l.* The contractor was the late Mr. John Spiller, the completion of the work having fallen upon his son and successor, Mr. H. J. Spiller. Mr. Frost executed the carving; and the bells were re-hung by Mr. Cattle, of Bradford. Mr. William Biss was clerk of the works. Mr. J. Houghton Spencer was the architect. Considerable improvements to the interior of the church have also been carried out by Mr. H. J. Spiller.

Clayworth (*East Redford*).—The parish church of St. Peter's, Clayworth, has been re-opened by the Bishop of Lincoln, after restoration. The expense was about 3,000*l.*, towards which the late rector (the Rev. Thomas H. Shepherd) left 1,000*l.* to be spent within three years from the time of his decease. The stonework of the exterior has been renewed; the stone mullions of the windows are now sharply defined, and filled with new lead casings and stanchions. In the interior, several of the arches having been bricked up are now re-opened, so that more than half of the north aisle has been restored to the church. New oak roofs have been placed on St. Nicholas's Chantry and on the chancel, while those of the aisles have been renewed. The oak seats of the Jacobean period have been replaced; in fact, the whole inside of the structure has been remodelled. New choir-stalls, of carved oak, have been placed in the chapel, and a new pulpit of the same material has been provided. The floors are laid with black and red paving tiles. The contractors were Messrs. Parkinson, of Clayworth; and Cawthorne, of Retford. Mr. John Scott (son of Sir Gilbert Scott) was the architect; and Mr. James Willis, of the staff of Sir G. G. Scott, acted as clerk of the works.

Chute Forest (*Wilts*).—The little church built for the inhabitants of Chute by Mr. Thomas Everett Fowle, of Chute Lodge, has been consecrated by the Bishop of Salisbury. It consists of a nave, chancel, and south transept, and will contain the whole population of the district. The exterior walls are of brick and flint; the interior walls are of red brick, with black courses, all made on the estate and of superior quality. The tower is situated over the south transept, and above it rises a lofty spire. The two pillars which support the nave arches are of stone, the arches being turned with red brick. The chancel is paved with Minton's glazed tiles, and above the altar is a carved reredos, comprising the figures of our Saviour and the four Evangelists, in stone. The east window is of stained glass, the main subjects in the three lights being the "Agony in the Garden," the Crucifixion, and the Resurrection. The other windows are all of opaque glass. The pulpit and chancel screen from the nave are of stone; the chancel stalls and open seats are of oak; and the roof is of foreign deal. The belfry contains a peal of six bells, placed there by the founder of the church, at a cost of 333*l.* There is also an improved chiming apparatus, by means of which the bells can be chimed from the church.

Colaton Raleigh (*Devon*).—The Church of St. John the Baptist, Colaton Raleigh, recently partially re-built, was re-opened on the 22nd ult. by the Bishop of Exeter. The old church, which had become fearfully dilapidated, consisted of two aisles of equal length, divided by an arcade of five pointed arches. At the north-eastern extremity of the north aisle was a small building, 21 ft. 8 in. by 12 ft., inclining much to the south, with a two-light east window, and a two-light square-headed window on the south side, both of Perpendicular date, and the whole covered with a cradle-roof. A flat four-centred arch, 9 ft. wide, opened from this building into the north aisle. The latter, also the nave, had cradle-roofs of the usual Devonshire type. A gallery at the west end blocked up the tower arch. The church provided accommodation for 217 people. On excavating at the western end of the north aisle, the foundations of the old wall of the lean-to aisle of the original early church, coëval with the arcade, were found; so it was decided to rebuild it on what was (as far as could be made out) the original plan. The new walls are built of stone from Ladram, and from some old houses lately pulled down at Exmouth. The windows, piers, and arches are of Ham-hill stone, and the roofs, screens, &c., of pitch-pine. The old stone-work has been repaired where necessary. The passages are laid with Webb's tiles, with some of Maw's encaustic tiles in the chancel. The walls have been picked out in patterns in sgraffito work, by Mr. Vickery, of Barnstaple (from drawings, &c., under the direction of the architect). The carving was executed by Mr. Harry Hems, of Exeter. The windows are glazed with differently tinted cathedral glass, except in the chancel and tower, where the painted glass from old memorial windows has been used. The church-yard has been lowered and enlarged, and a boundary-wall and gates added. Mr. R. Medley Fulford, of Exeter, was the architect. The total cost is about 1,800*l*.

HASTINGS NEW TOWN HALL COMPETITION.

WE understand the premiums are to be awarded to the three designs chosen by the Town Council at the last monthly meeting, provided that the conditions mentioned in the "instructions to architects" be fully complied with by their respective authors.

It will be remembered that we pointed out several fatal defects in the plans recommended for the first premium at the time the designs were submitted to public inspection, and we cannot see how the Council can excuse themselves if they adopt a design that does not fulfil the terms of the instructions.

We are in no way inclined to change or modify our expressed opinions as to the Council's proceedings: on the contrary, further consideration of the facts has tended to strengthen and confirm them.

RAILWAY ACCIDENTS IN LONDON.

AT various times you have done good service in your paper to residents in London, by calling attention to the insufferable railway whistle and its cause—viz., the whistling down of danger-signals and the neglect of the block system. Special attention has more than once been directed to this damaging nuisance at the North of London, on the North London Railway, and the inhabitants near the Newington-green-road consider it entirely due to some of your remarks that more signals are now used on the dangerous part of the line between Dalston and Canonbury. The signals are, however, together with the block system, not uncommonly ignored on this line, and reports of accidents seldom appear in other than the local papers.

On Friday, June 25th, at 7·30 p.m., a luggage train slowly passed the *Builder* signals near the Newington-green-road, and, a moment or two afterwards, an express train, full of passengers, rushed by *on the same line*, with all the breaks suddenly put on. Then, between Dalston and Canonbury, came a dangerous collision, in which the guard's van of the luggage train was smashed to pieces, one truck thrown on to the bank, the express engine thrown on to its hind wheels and disabled, and the line stopped. It will be seen from the above that the block system was totally ignored, for an express train full of passengers was allowed to leave Dalston before the lumbering luggage train on the same line of rails had got halfway to the next station. When the block system is at length used on this line, and the signals are attended to, the insufferable and damaging whistle can be dispensed with. A.

THE VENTILATION OF SEWERS.

MIGHT I trespass upon your valuable space in drawing attention to a very simple yet effective invention for thoroughly ventilating sewers of their poisonous gases?

The system to which I refer is that known in this part of the country as "Stott's patent ventilator," a most useful and inexpensive apparatus, and one which might easily be adopted in all manufacturing towns.

An air-tight sheet-iron door is fixed to the ash-hole of a boiler, and connected with the drain by stoneware pipes: the fire is thus fed by the noxious gases, and a continual flow of air drawn from all the adjacent sewers.

For the last few years I have advocated open grates to admit the fresh air into the sewers; however, during long droughts these are objectionable, for unless the sewers are properly flushed with water, the gases generate, and escape into the streets, to the annoyance of those who live in the neighbourhood: this is at once obviated by applying "Stott's ventilator" for the untrapped gullies and openings (within a reasonable distance) become inlets for fresh air, instead of outlets for sewer gases.

It is, however, necessary, in order to limit the number of ventilators, to trap all the openings within a radius of 300 or 400 yards; thence to the extent of the district the gullies might be open to admit air to fill up the partial vacuum formed by exhaustion.

I have already four fixed in this town, and up to the present time I know of no system that, for simplicity, efficiency, and economy, at all equals Mr. Stott's invention.

A model has been sent to the Manchester Exhibition, where I hope it will be carefully examined and considered by many of my professional friends.

EDWARD R. S. ESCOTT,
Borough Engineer and Surveyor.

Halifax.

THREATENED STRIKE IN THE LONDON BUILDING TRADE.

LAST week the men in the employ of Messrs. Manley & Rogers, and also those in Messrs. Elkington's, left work until the two hours' notice grinding-time was conceded. In the case of Messrs. Manley & Rogers, the firm yielded the point, and the men returned to work, but we are informed that Messrs. Elkington refuse to comply with the terms demanded by the men, and that the latter are now on strike. We learn that during last week and the present the men in different parts have held district meetings, at which the two hours' notice has been insisted upon, and that a general aggregate meeting, with the same object, is shortly to be held, with the view of compelling the different firms of employers to concede the point; and that in the case of those firms who refuse to do so, the men will strike. It is to be hoped, however, that a few days will serve to settle the matter amicably between the employers and employed, and thus prevent a step which can only end in disaster.

"THE GRINDING MONEY" QUESTION.

SIR,—There have been announcements in your paper, as also in the daily newspapers, of an impending strike in the building trade on account of "grinding money," and it has been generally asked what can be the meaning of a strike on such a trifling matter. Now, sir, it has always been acknowledged that a joiner or carpenter on being discharged should have proper time allowed him for sharpening and putting his tools in order for another job. In former times it was considered that two hours was a fair time to be allowed for this purpose. A joiner had to provide a larger number of mortise chisels, planing-irons, &c., which are no longer required in shops where machinery is applied. Moreover, in former times the grindstone could only be moved slowly by hand, whereas now grindstones are kept constantly revolving by machinery, so that a joiner at the present day has his tools always in order, and only needs a very short time to clean and pack them up on being discharged. The practice has varied of late in the building firms of London. Most of them have not admitted any fixed time at all for grinding. Some shops allow one hour, and some of the oldest shops still allow two hours. But two hours being quite unnecessary in the majority of cases for grinding, &c., the Carpenters' and Joiners' Union have now, on the foundation of this old custom, attempted to build up what they call "the two-hours' notice movement." By this movement it is required that every workman shall be entitled to two hours' notice of discharge, and on receipt of such notice he is to be allowed to cease work, and to pass the two hours in any way he pleases.

The master builders are unable to see the justice of giving two hours' pay on discharge to a carpenter or joiner any more than to any other artisan, and have declined to discuss the question, at the same time fully admitting that the carpenter and joiner should be always allowed sufficient time for grinding his tools. I trust you will allow this explanation to appear in your paper in order that all interested may clearly understand the position.

A MEMBER OF THE
ASSOCIATION OF LONDON BUILDERS.

WANTED! THE METROPOLITAN BUILDING ACT.

CORRESPONDENTS lament that they cannot now obtain copies of a Pocket Edition of the present Metropolitan Building Act, and ask us to suggest that some able, practical, and experienced man should undertake a new edition, like that edited by Sweet & Baxwell, with the clauses taken from the Metropolitan Local Management Bill, and reports of the many cases heard in the Police-courts, the judgments given by the magistrates, and the various instructions issued by the Metropolitan Board of Works. It does not seem likely that any remodelling of the Act will be attempted for some time to come, and a new edition is required for builders and professional men engaged in building operations.

THE GASES FROM CEMENT KILNS.

SIR,—Some few years ago I wrote to you, stating what we had done relative to consuming the gases and fumes arising from Portland cement kilns, and making use of the waste heat for drying the slurry, thus doing away with coke ovens.

Now we, of late, have had much fuss and talk, leading the inhabitants in our neighbourhood to believe that some parties wished to shut up cement works. They say that there are no scientific means in existence for effectually consuming the gases arising from cement kilns. I will respectfully lay before your readers what I have done, and what manufacturers can do themselves, just as simply as a man ploughing a field. A great heat is got from consuming the gases; then pass them through flues under tiles for drying the slurry before being burnt in the kilns; and to effectually consume the gas I place three furnaces made of a zigzag form. I then bring all the smoke and fumes to a point,—or say centre,—of six kilns; here I place these furnaces, over and through the fires of which the gases and fumes have to pass, and directly these leave the last furnace they pass through a shower, similar to rain, falling on them from a tank there placed. Should there be any chance of the least particle escaping, it would be thoroughly destroyed before it passed up a large heated flue, which is placed directly after the water-tank or shower process, and this 100 ft. of heated flue before it reached its chimney-shaft.

So you see the gases pass over the fires, then the shower process, then up this 100 ft. of heated flue, and on the top of this flue I dry the slurry before it is burnt in the kilns. This, I think, is a simple fact, and if any of your readers do not know how to consume the gases from cement-kilns, what I have here stated is the practical working experience of many years. There is but one shape of furnace in which these gases will burn, which I have well tested. A great heat is obtained and a great saving of fuel; because, if you dry slurry with the waste heat from the kilns, it proves there is the saving. Some may say "My ground is not suitable to dry with the kilns and consume my smoke." I say they effectually can. First build arches, any number; place the drying-floor on the top or roof of the arches; under the arches they can make warehouses, shops, or use them for any purpose re-

quired. In conclusion, I would say, in consuming the gases, a 25-ton kiln takes four days to burn off; whereas, if you let the kiln be open at the chimney-top, and let the gases escape directly into the air without being destroyed, the kiln takes but forty-eight hours. Thus you simply require six kilns to do the work of four; but, if so, see what is saved by doing away with coke ovens, and effectually consuming the gases, so that cement works really shall not cause a nuisance.

Northfleet. W. MAY.

Books Received.

Technological Dictionary (English - German - French). By A. & L. TOLHAUSEN. Leipzig: Tauchnitz. London: Sampson Low & Co.

THIS is a triple dictionary, giving the equivalents, in the three languages indicated, of "about 76,000 technical terms and locutions employed in arts, trades, and industry in general." The original editor is Herr Alexander Tolhausen, translator to the Great Seal Patent Office; and the book is revised by Herr Louis Tolhausen, French Consul at Leipzig. To those who have much to do with practical books in different languages, or work in different countries, this dictionary should be most useful. The trouble experienced in translating descriptions of building operations, or of mechanical problems and processes, out of a foreign language, is increased by the fact that the ordinary dictionaries often give no help at a critical point, as this class of subjects brings into use so many purely technical expressions, or arbitrary meanings attached to words, which a general dictionary of the language can scarcely be expected to take account of. The present volume is the second of a series devoted to the same three languages, of which the first (French-German-English) has appeared, and the third (German-French-English), which completes the series, is to appear in the course of the present year. The labour gone through in compiling a dictionary of this kind is, as may be supposed, very considerable; and the second part bears evidence, as far as such a book can be judged of by a general examination, of the care with which it has been edited. A supplement gives such words as have "turned up" while the work was going through the press, and a list is added of *errata*, "unavoidable," as the editors may fairly say, "six revisions notwithstanding." The dictionary ought to be very useful to many in the three countries whose languages it comprises.

Miscellanea.

Metropolitan Drinking Fountains.—Under the presidency of the Duke of Westminster, the annual meeting of the Metropolitan Drinking Fountains Association was held at Willis's Rooms. Mr. John Lee, F.R.G.S., read the report, which stated that in the last twelve months the committee had established no fewer than sixteen large cattle-troughs and twenty-one drinking-fountains, with dog-troughs attached. They had also taken over and repaired, and in some cases taken down and reconstructed, eight cattle-troughs and twenty-four fountains, which had been put up by private benevolence. The total number of erections at present was as follows:—276 fountains and 72 large cattle-troughs, besides 199 small troughs for dogs and sheep, the fountains extending over an area of more than 300 square miles. For the first time in the history of the society the fountains had been kept running all through the winter, and it was found that a very large number of animals availed themselves of the water supplied them. The noble chairman having briefly addressed the meeting, Cardinal Manning moved the adoption of the report, which was seconded by the Hon. A. Kinnaird, supported by Mr. S. Morley, M.P., and Sir. T. F. Buxton, and carried unanimously.

Memorial Fountain at Wormhill.—Last week, the members of the Phœnix Lodge of St. Ann, of Buxton, with several brethren from other lodges, met at Wormhill, to assist in laying the foundation-stone of a fountain to the memory of James Brindley, the engineer, who was born in the parish, at Tunstead, about a mile from Wormhill. The plans show a stone structure for the springs near the centre of the village, and which, in the most droughty summers, were never known to fail. The architect is Bro. Robert Griggs, of Gray's-inn-square, London.

A Warning as to Ladders.—Mr. Danford Thomas, the deputy-coroner, held an inquest at the University College Hospital, on the 26th ult., on the body of William Glass, aged forty-seven, a painter, of 7, Clarence-road. On the 22nd ult., the deceased was engaged painting the front of the Prince of Wales Tavern, Ferdinand-place, and ascended nearly to the top of a very high ladder, fastened his paint-pot in the usual manner, and held on to the ladder with his right hand, his right leg being twisted round the uprights. He reached over to paint at the extreme length of his left arm, when his weight caused the ladder, which was not fastened to the top parapet, to glide sideways, and he fell on to the stones below, the ladder falling across his body. The jury desired to express their opinion that if builders' workmen were to take the usual precautions while at work, many scaffold and window accidents would be avoided, it having come to their knowledge that this was the third inquest held on builders' workmen in Central Middlesex during the day, in each instance families being plunged into grief through the carelessness of the deceased men. The jurors trusted that these disasters, if noticed by the press, would act as a warning to those belonging to the trade.

Building Operations in South Gray's-Close, Edinburgh.—Extensive clearances of old property have been going on for some time past in South Gray's-close, High-street, with the wholesome result of adding another and much-needed lung to that densely-populated portion of the Old Town. What was a short time back a dark and narrow close has by these operations been almost entirely opened up to the dimensions of a respectable modern street. The clergymen of St. Patrick's Roman Catholic Chapel, some time ago, and in view of the operations of the Improvement Trustees, resolved to pull down their old chapel-house,—formerly known as the Earl of Selkirk's house,—and build a new one on a site immediately to the east of the old building, and partially on ground purchased for the purpose from the Improvement Trustees. The plans of the new building, which is now rapidly approaching completion, have been designed by Mr. R. Morham, junior, city superintendent of works, and are in the old Scotch style, so far as Mr. Morham thinks it to be consistent with modern notions of light and air.

Ventilation on Board Cattle Ships.—In a very fine iron screw steamship, *Royal Dane*, Capt. Webster, recently built by Messrs. J. Wigham Richardson & Co., Neptune Shipyard, Low Walker, on the Tyne, for the Tyne Steam Shipping Company, and intended for the trade between Newcastle and Copenhagen, arrangements are specially made for the cattle trade, the company to whose order she has been built having contracted to carry from Copenhagen to the Tyne no less than 500 head of cattle and sheep every week all the year round. The decks upon which the cattle will be berthed are lofty and spacious, and provision for supplying the animals with fresh air has been made by means of a large number of ventilators, and also by a double hatchway, through which a constant current will be maintained from one end of the ship to the other. When in port, ventilation will be provided by means of a steam-engine. The latter provision is rendered necessary by the deficiency in the accommodation at present provided at Newcastle Quay for the landing of cattle, so that vessels have frequently to be at the quay for twelve hours and upwards after arrival before they can discharge their cargoes.

A Singular Accident.—A few weeks ago an accident of a very serious nature, though in itself trivial, occurred to Mr. Poynor, foreman of the engineering department of Messrs. Kirk & Parry, Sleaford, who, in crossing the chamber floor, trod upon a needle sticking upright in the carpet, which penetrated the sole of his foot. Dr. Jacobson and Dr. Bissill were called in, but their joint efforts were unavailing, and a fatal termination took place on the 17th ult. Deceased was greatly respected; he had been in the employ of Messrs. Kirk & Parry for about twenty-two years. The funeral took place on the 19th ult., and was attended by eighty of his fellow workmen, headed by Messrs. Kirk, Parry, and Kinght.

The Westminster Aquarium.—We are told that nearly five millions of bricks have been used in this building, the greater part of them having been supplied by Mr. W. T. Wiseman, of Southwark.

The Proposed Municipal Buildings, Newbury.—On Tuesday, the 22nd ult. the Town Council selected the design of Mr. James H. Money, of Speenhamland, which was recommended by Mr. Joseph Morris, the County Surveyor, whose opinion upon the various designs had been solicited. The new buildings will cover the site of the present public offices adjoining the Town-hall, and also that of the houses now occupied by Mr. H. Ford and Mrs. Perry. Mr. Money's plan comprises a frontage of about 80 ft. The ground-floor arrangements consist of a police-court, 37 ft. by 27 ft., with an elevation to the Market-place. In connexion with the court there will be a separate entrance for the public, a waiting-room for witnesses, 15 ft. by 12 ft., and a magistrates' retiring-room, 20 ft. by 14 ft. 6 in. The principal entrance to the Town-hall will be through a porch in the tower, opening into a vestibule and grand staircase. On the first-floor will be a council-chamber, 37 ft. by 27 ft., with retiring and committee-rooms, most conveniently placed; and the new approaches and rooms connected with the Town-hall.

A Spire struck by Lightning.—The shattered condition of the spire of West End Church, Southampton, struck by lightning a fortnight since, has attracted large numbers of persons to inspect it, and wonder has been expressed at the destructive power of the electric fluid. There is little doubt that had the spire been provided with a conductor the catastrophe would not have happened. A meeting, to consider the condition of the fabric, was held at the National Schools, on the 22nd ult., the incumbent, the Rev. Dr. Hatherell, in the chair, when it was resolved that the spire be taken down; that the general urgent repairs to the church be executed; and that a temporary roof be placed on the tower, at an estimated cost of 150*l*. Mr. Colson is the architect, whose estimate for the thorough repair of the church is 452*l*.

The Princess Mary's Village Homes.—The 26th of June was a great day at the Princess Mary's Village Homes, Addlestone, Surrey. Two new homes were opened, and two foundation-stones were laid. The institution, which is an offshoot of the Prison Mission, has been established for the purpose of protecting and training in virtuous living female children of persons in penal servitude, and other girls who are sent to it either under the Industrial Schools Act or as voluntary pupils. It is conducted on the cottage system. In each cottage or "home," as it is called, there are about ten children and a "mother" who has the charge of them. There is also a school building which serves, besides, for a place of worship; but the present accommodation being insufficient, and contributions towards the cost having been made, it has been determined to build an additional wing.

Floods in France.—The continued heavy rain has caused disastrous effects in many parts of France. At Toulouse the Garonne flooded the quarters of St. Cyprien, Port Garaud, and Tonnis. The bridge of St. Pierre, leading to the arsenal, and the suspension bridge of St. Michel have been carried away, while the bridge of Empalot is reported as being in danger. The floating baths and wash-houses have been destroyed, and many houses have fallen and are falling. The hospitals of Maison Dieu and La Grave have been evacuated, and the railway service on the line between Foix and Montrejeau has been stopped. The damage done is immense, and most of the houses in the Quartier St. Cyprien are destroyed. At Verdun, in the Department of Airège, more than fifty houses have fallen.

Morris's Measuring Instrument.—This ingenious instrument is intended to perform those services for which the measuring tape is now employed, with the advantages that it does not necessitate the employment of two persons, and that it registers to 100 ft. instead of 66 ft. The instrument has the appearance of a watch, and, to use it, it is merely necessary to advance the wheel along the surface to be measured, when the large hand will indicate the inches and fraction of an inch, the smaller hand the feet, and the third hand the tens of feet. We quite agree with the inventor that Morris's measuring instrument will be especially useful to builders, timber merchants, and upholsterers.

Assistant Draughtsman, Director of Works Department, War Office, London.—Mr. John Michelen Rogers has been appointed to this office. He has practised as an architect in Bristol, and was formerly a pupil of Messrs. Pope, Bindon, & Clark (now Pope & Son).

Opening of the Swansea Corn and Flour Stores and Bonded Warehouses. — The opening of the spacious premises situated in Little Wind-street, Swansea, known as the Swansea Corn and Flour Stores and Bonded Warehouses, just erected for Messrs. B. R. Harvey & Fish, will prove of importance to the trade of the town and port. The new buildings consist of five stories, with spacious lofts, capable of holding immense stores of flour and corn, whilst the equally spacious cellars underneath will be utilised as bonded warehouses, for wines and spirits. The architect was the Rev. Thomas Thomas; and the builder, Mr. Thomas Rees.

The New Opera House.—Mr. Boord gave notice, in the House of Commons, last week, on behalf of Colonel Beresford, that on July 23rd he would call attention to the intended encroachment on the Thames Embankment by the erection of the New Opera House, and would move,—"That, in allowing the building frontage on the Thames Embankment to be advanced within 30 ft. of the roadway, the Metropolitan Board of Works is acting in contravention of the policy intended to be affirmed by the resolution of this House of the 8th of July, 1870, whereby the Embankment was secured as an open space for the use of the people."

Sale of an Ancient House in Dumfries.—The venerable building in South Queensberry-street, Dumfries, known as the "Amisfield Lodging," has been sold to the Co operative Store Company—one of the tenants—for 750*l*. The company intends to erect on the site a new building, from plans by Messrs. A. Crombie & Son, architects. The Amisfield Lodging is nearly the last of the remaining town houses which the knights and lesser barons of the south-west Border had in Dumfries, and in the sixteenth and seventeenth centuries was a residence of the Charterises of Amisfield, whose ancient tower is still in fair preservation five miles north-east of Dumfries.

The West Cliff Improvement Scheme, Whitby.—A meeting of the committee selected to manage the preliminary matters in relation to this scheme was held on the 22nd ult. Though no canvass of the town has been made, and no prospectus issued, 2,000*l*. have already been guaranteed, independently of Sir George Elliot's subscription of 7,500*l*. The amended scheme, which Sir George Elliot has himself proposed, consists of removing the site of the proposed company's gardens and hall to the extreme western boundary of the estate, which is next to Argyle-road or Cinder-lane. In this scheme there is obtained a grand terrace of some 430 ft. in length by 120 ft. in depth.

Caution to the Builders of Stands.—Duncan Brown, the lessee of the Rutherglen-bridge Recreation Grounds, near Glasgow, where on the opening day the grand stand fell, causing serious injuries to a large number of its occupants, was tried before the sheriff and jury at Glasgow, on a charge of culpable recklessness and neglect of duty. The allegation of the public prosecutor was that the stand was constructed of unsound material, and not in a substantial manner. The jury returned a verdict of guilty, and Brown was sentenced to four months' imprisonment.

St. James's Hall Company.—On Saturday evening in last week the St. James's Hall Company entertained at dinner the contractors, foremen, and workmen employed by them in erecting the additions which are being made to the hall, and which comprise a handsome frontage in Piccadilly, a restaurant, and a suite of dining-rooms. Mr. John M. Howard, C.E.,—under whose superintendence the works are being executed from the designs of Mr. Emden, architect,—occupied the chair; and Mr. Bowes, as representative of Messrs. Lucas, the contractors, was vice-chairman.

Increase in the Price of Slating.—Architects and contractors will have reason for the future to substitute tiles, zinc, or even lead, for roofing if slates are to run up month after month in price. At a recent meeting of a number of master slaters of the North of England, held at the Queen's Hotel, Middlesbrough-on-Tees, it was unanimously resolved to advance the price of slating 5 per cent. on account of the advance in the prices of slate at the quarries.

Glanvilles Wootton Church.—The estimated expense for restoring this church, exclusive of the chancel, is 850*l*. Mr. Dale is restoring the Glanville chantry at his own expense.

Keble College.—Two persons who do not wish their names to be known have offered to the Warden and Council of Keble College to defray the cost of the library and hall, which will probably not fall short of 26,000*l*. The chapel built by the late Mr. W. Gibbs will be opened on St. Mark's Day, 1876, the birthday of Mr. Keble, and exactly ten years since the plan of the college was put on foot. One hundred and thirty rooms for undergraduates have been built, and the success of the college in the schools has exceeded the anticipations of its warmest friends.—*Church Herald.*

The Chichester Waterworks. — Messrs. Hassell & Co., of Felixstowe, Ipswich, the contractors for the Chichester Waterworks, have been compelled to suspend payment, and have filed a petition for the liquidation of their affairs. It is said that the liabilities of the firm are sworn at 3,000*l*., and the assets at 6,000*l*., exclusive of a claim of 13,500*l*. due to them for materials supplied and breach of their Orwell Railway and Pier contract, a contract on which they were for some time engaged and which has resulted in litigation.

Opening of a New Wesleyan Chapel at Low Spennymoor.—On the 23rd ult., a chapel erected by the Wesleyan body of Spennymoor was opened for public worship. The new edifice adjoins the Wesleyan day schools at Low Spennymoor, and is built of stone blockers from the Tow Law Quarries, the stone having been given by the Weardale Iron and Coal Company. The building is of "semi-Gothic architecture." Accommodation has been provided for 700 people. The cost is estimated at 2,000*l*.

Monuments for Sarawak.—The *Sarawak Gazette* of January 5th, says:—"Two monuments arrived by the last steamer: one is to be erected on the Astana grounds, to the memory of the children of their Highnesses the Rajah and Ranee; the other to be placed in the European cemetery, over the grave of the late resident, the Hon. Henry Skelton. The monuments are of white Sicilian marble, and of choice workmanship. They are by Mr. Thomas Tyley, senior, of Bristol."

Workmen's Club Journal.—The Council of the Club Union have established a special organ for the publication of information, suggestions, facts, and experiences. It is intended to contain information on all matters relating to the detail of club management, such as the recreation, amusements, literary and scientific pursuits of its members, as well as on subjects connected with various organisations for the improvement of their social position.

Enlargement of Fisherton Church, Salisbury.—The tenders for the erection of a new north aisle, porch, &c., to this church have been sent in. The lowest amounted to 1,806*l*., and adding to this for extras (viz., pulpit, desk, lectern, gas fittings, repair of organ, Communion cloth for table, &c.), the sum of 500*l*., the cost of the proposed improvements will not be less than 2,300*l*.

A Memorial Cross at Holy Rood Church, Southampton.—A brass cross—provided by Messrs. Lankester, has been set in the pavement, opposite the south door of Holy Rood Church, to permanently mark the spot where the large stone ball fell from the north-west corner of the tower among a crowd of people, without injuring any one, on the occasion of the opening of the Hartley Institution.

Buxton Shakspeare Hotel.—This hotel has been purchased by a company, at a cost, it is stated, of 10,730*l*. for the lease of fifty-one years and the goodwill; 4,500*l*. for fixtures, furniture, carriages, and horses; 2,000*l*. for stock in cellar; 500*l*. for cigars. The whole of the valuations have been made by Mr. T. W. Brittain, of Fairfield, for both sides, and the valuations have been accepted without challenge.

Skating Rink and Recreation Ground for Swansea.—A new skating rink and recreation ground has been opened at Swansea during the past week. It is situate at St. Helen's, in a beautiful spot overlooking the bay. The skating rink is composed of French asphalte, smooth and glassy. This latter is the design and work of Messrs. Bradshaw & Co., of Totterdown, Bristol.

Paving St. Paul's Churchyard.—The Commissioners of Sewers, at their meeting on the 22nd ult., resolved to pave the remaining portions of the carriageway on the south and east sides of St. Paul's Churchyard with wood, at an estimated cost of 2,105*l*.

The New Cemetery at Evesham. — The Church portion of the new cemetery was consecrated on the 25th ult. by the Bishop of Worcester. The chapels, which are in the geometrical style, are built with local stone, with Red Bromsgrove and Bath stone dressings. The cost is about 2,500*l*. The architects are Messrs. Sansome & Lunn, Birmingham. The builder is Mr. Alfred Espley, Evesham.

The new Church at Awbridge, near Romsey.—The first step towards the erection of this edifice was taken on the 21st ult., when the Rev. T. H. Tragett, assisted by the architect, Mr. J. Colson, of Winchester, set out the foundations of the building, the first plug being driven by Mr. Tragett, and the works have now been commenced. The contract has been taken by Mr. John Crook, of Northam, Southampton.

The New Road across Hyde Park Corner. The model showing the proposed approach to Grosvenor-place by a sunken road to be carried under Piccadilly and the Green Park from Hamilton-place is now on view at the House of Commons. It is stated that the road is to be sufficiently wide to admit of two carriages abreast, with side-walks for foot-passengers.

Gymnasium at Bradford Grammar School.—A spacious gymnasium, erected in connexion with the newly-organised Bradford Grammar School, was formally opened last week by the Mayor of Bradford (Mr. H. Mitchell). The building has been erected by public subscription, at a cost of nearly 3,000*l*.

Bricklayers' Wages, Middlesbrough.—The Middlesbrough bricklayers have sent in a notice to their employers demanding 3*s*. per week increase of wages, and a reduction of hours. The men now commence work at six, but propose to commence at half-past six. The demand will be a serious matter for contractors to deal with.

Fire near Gateshead-on-Tyne.—On the 25th ult. a fire broke out on the extensive premises at Dunston, near Gateshead-on-Tyne, the property of Messrs. Palmer, Hall, & Co., consisting of saw-mills, timber-yard heavily stocked, and other buildings. It is estimated that the loss will exceed 20,000*l*.

Closworth Church.—The nave of the church is to be restored, at a cost of about 800*l*. The plans for the restoration were furnished from the office of Mr. H. Parsons, Viscount Portman's estate agent, and the work will be carried out under his direction. The contractor is Mr. F. Cox, of Yeovil.

Institution of Civil Engineers.—There has been an increase in the last three months of 1 honorary member, 12 members, 40 associates, and 20 students, the numbers of these several classes being now 16, 832, 1,463, and 333,—making together 2,644 of all grades.

Foundation-stone Laying at Wingate.—The populous place of Wingate, midway from Durham to Hartlepool, was the centre of great attraction on Saturday last, on the occasion of a foundation-stone laying for a Workmen's Literary Institute.

Society for the Encouragement of the Fine Arts.—The seventeenth session of this Society was brought to a successful termination by a *conversazione*, held at South Kensington Museum, on June 24th.

Opening of a New Unitarian Chapel at Glossop.—A Unitarian Chapel, erected at the sole cost of Mr. E. Potter, of the Dinting Print Works, Glossop (late M.P. for Carlisle), was opened at Glossop on the 19th ult.

Society for Improving the Condition of the Labouring Classes. — The thirty-first annual meeting of this Society was held on the 24th ult. We may give an account of the proceedings in our next.

Sanitary Inspector of Lichfield.—We are informed that Mr. E. Coxell, inspector for the Worcester Rural Sanitary Authority, has been appointed sanitary inspector to the city of Lichfield, at a salary of 150*l*. per annum.

Penzance Reservoirs.—The tender of Mr. William Robbins, of Penzance, to execute the improvements to the reservoirs of that town for 4,500*l*., has been accepted by the Urban Sanitary Authority.

Architectural Association.—The closing general meeting was held on the 25th ult., when a paper on the "Decoration of Churches" was read. We reserve our report.

TENDERS

For the erection of a church at Awbridge, near Romsey, Hants. Mr. John Colson, architect. Quantities by Mr. J. B. Colson :—

Stainer & Sons	£4,716	0	0
Godbolt	3,050	0	0
Hagon	2,652	0	0
Barnes	2,000	0	0
Maklin	2,434	0	0
Newman	2,398	0	0
Crook (accepted)	2,250	0	0
White	2,190	0	0

For alterations at the Black Horse Tavern, 6, Rathbone-place, Oxford-street, London, for Mr. E. C. White. Mr. W. F. Potter, architect :—

Perkins	£163	0	0
Burningham & Co.	161	0	0
Sabey & Son	158	0	0
Blott (accepted)	140	0	0

For alterations and additions to offices, 10, Idol-lane, for the Trustees of the parish of St. Dunstan-in-the-East :—

Peto Brothers	£1,629	0	0
Longmire & Burge	1,595	0	0
Foster	1,555	0	0
Wood	1,546	0	0
Ashby Brothers	1,532	0	0
Bankes	1,500	0	0
Brass	1,457	0	0
Heath	1,445	0	0
Bayes & Ramage	1,418	0	0
Potter	1,410	0	0
Ellis	1,259	0	0

For alterations, repairs, painting, &c., to premises, 43, St. Paul's Churchyard, for Mr. P. D. Kain :—

Johnson & Co. (accepted)	£275	0	0

For Wesleyan Schools, St. Peter's-street, Tiverton. Mr. Amos Crisford, architect. Quantities by Mr. R. Carpenter :—

Hamlin	£947	5	6
Grater & Pyle	800	0	0
Williams	783	7	10
Stratford	729	10	0
Cole, Willis, & Pratt (accepted)	721	5	8

For tavern, Jewin-street, City. Messrs. Herbert Ford & R. Lempriere Hesketh, architects :—

Kirk & Randall	£5,421	0	0
Smale	5,166	10	0
Adamson & Sons	5,125	0	0
Lawrence	5,121	0	0
Killby	5,109	0	0
Scrivener & White	5,085	0	0
Perry & Co.	5,077	0	0
Brass	4,965	0	0
Ashby Brothers	4,899	0	0
Merritt & Ashby	4,798	0	0
Downs & Co.	4,751	0	0
Crabb (accepted)	4,406	0	0

For two warehouses in Hamsell-street and Jewin-street, City, E.C. Mr. Herbert Ford, architect :—

Smale	£5,215	0	0
Ashby Brothers	5,097	0	0
Kirk & Randall	5,011	0	0
Merritt & Ashby	4,986	0	0
Perry & Co.	4,876	0	0
Adamson & Sons	4,815	0	0
Lawrence	4,807	0	0
Killby	4,798	0	0
Scrivener & White	4,782	0	0
Brass	4,751	0	0
Downs & Co.	4,620	0	0
Crabb (accepted)	4,455	0	0

For alterations and additions to Brewery, Lower Norwood. Messrs. Bird & Walters, architects. Quantities supplied :—

Wallis	£935	0	0
Ward	868	0	0
Burtwell	789	0	0
Nightingale	765	0	0
Deacon	760	0	0
McLachlan & Son (accepted)	720	0	0

For rebuilding Seaford House, Seaford, Sussex, for Mrs. Holland. Mr. Stephen Salter, architect :—

Cheeseman & Co.	£3,280	0	0
Moreling	3,090	0	0
Berry	3,050	0	0
Vidler	2,994	0	0

For new schools at Garndiffaith, for the Trevethin School Board, Monmouthshire. Mr. E. A. Lansdowne, architect :—

Stephens & Bastow	£3,313	0	0
Everal	3,184	0	0
Love	2,721	0	0
Jones	2,697	0	0
Burgoyne	2,670	0	0
Williams & Sons (accepted)	2,599	0	0

For erecting warehouse buildings, White Horse-lane and Friendly-place, Mile-end Old Town, for Mr. Stapleton. Messrs. H. S. & C. A. Legg, architects :—

Hearle	£1,055	0	0
Hunt	881	0	0
Webb	877	0	0
Wood	873	0	0
Judd & Hawkings (accepted)	820	0	0

For constructing about 1,310 ft. run of 12-in. pipe, and 30 ft. run of 3 ft. 9 in. by 2 ft. 6 in. brick sewers, in the Mall and Mall-road, Hammersmith, for the Fulham District Board of Works. Mr. Alfred C. Bean, engineer. Quantities by Mr. Alfred J. Bean :—

Thompson	£570	0	0
Chapel	550	0	0
Wilson	548	0	0
Nowell & Robson (accepted)	406	10	0
Wigmore	475	0	0

For schools and master's residence, at Lane-end, for the Cheriton School Board. Mr. T. Stopher, architect :—

Fielder & Son	£875	0	0
Jacob & Marsh	860	0	0
Purey	840	0	0
Crook (accepted)	769	0	0

For rebuilding a warehouse, Aldermanbury, City. Mr. Herbert Ford, architect. No quantities :—

Bostel	£1,197	0	0
Sharman	1,145	17	8
Boyce	1,011	0	0
Crabb	1,002	0	0

For sundry alterations and new shop-front at 185, Blackfriars-road. Quantities by Mr. E. Morfee :—

	Alteration.	Shop-front.
Blott	£725	£150
Woodward	650	165
Langmead & Way	639	175
Bayes & Rammage	645	155
Lawrance	631	169
Tarrant	617	153
Outhwaite & Son	628	138

For new buildings for the Estates Association, Limited, on land in rear of Drapers' Hall, Throgmorton-street. Mr. Robert Walker, architect :—

Rider & Son	£110,200	0	0
Lucas Brothers	108,595	0	0
Macey	107,775	0	0
Brass	104,434	0	0
Ashby Brothers	103,295	0	0
Trollope & Sons	102,059	0	0
Scrivener & White	100,530	0	0
Eunor	99,832	0	0
Sewell & Son	99,621	0	0
Simpson & Son	98,786	0	0
Ashby & Horner	96,483	0	0
Killby	94,198	0	0

For alterations to the Station Hotel, Camberwell New-road, for Mr. Simms. Mr. George Treacher, architect :—

Andrews	£369	0	0
Batley (accepted)	318	0	0

Simpson (too late).

For alterations to the Raymond Arms, Jamaica-level :—

Day (accepted)	£160	0	0

For alterations to the Trevor Music-hall, Knightsbridge, exclusive of glass work and pewtering, for Mr. E. G. Chapman. Mr. George Treacher, architect :—

Day (accepted)	£1,050	0	0

For new whiting manufactory at St. John's Wharf, Surrey Canal, for Mr. Bewlay. Mr. George Treacher, architect :—

Thompson	£622	0	0
Palmer	599	0	0
Smith	493	0	0
Deavin (accepted)	445	0	0

For new club-room at the Lord Hill Tavern, Peckham, for Mr. Lewis Wakely. Mr. G. Treacher, architect :—

Cooper	£328	0	0
Shapley	310	0	0
Terry	287	12	0
Willes	268	0	0

For rebuilding the main building of the Lord Hill Tavern, for Mr. Wakely. Mr. G. Treacher, architect :—

Willes	£1,326	0	0
Batley	1,159	0	0
Macey	1,075	0	0
Palmer (accepted)	1,025	0	0

For new tavern, Mayall-road, Brixton, for Mr. E. G. Chapman. Mr. G. Treacher, architect :—

Macey (accepted)	£1,500	0	0

*Bar Fittings.**

Macey	320	0	0

* Exclusive of glass and pewtering.

For new bar fittings, exclusive of glass and pewtering, to the Red Cow Tavern, Mile-end-road, for Mr. A. Billinghurst. Mr. G. Treacher, architect :—

Macey	£347	0	0

For alterations to the Dolphin, Whitechapel-road, for Mr. Wm. Woolley. Mr. Treacher, architect :—

Steed	£297	0	0
Palmer	279	0	0
Hunt	248	0	0
Judd & Hawkings (accepted)	217	0	0

For new bar fittings to the Sir William Gomm Tavern, Bermondsey, for Mr. Scotts. Mr. George Treacher, architect :—

Macey	£350	0	0
Day (accepted)	275	0	0

For alterations to Lilliput Hall Tavern, Jamaica-road, Bermondsey, for Mr. R. Goodman. Mr. G. Treacher, architect :—

Lugg	£697	0	0
Palmer	475	0	0
Batley (accepted)	445	0	0

Bar Fittings.

Batley (accepted)	255	0	0

For erecting Infants' School and teachers' residence, at Patcham, for the Patcham School Board. Mr. G. Tuppen, architect :—

Dancy	£930	0	0
Patching & Webber	900	0	0
Lockyer (accepted)	855	0	0
Still	850	0	0

TO CORRESPONDENTS.

Chas. L., Paris (we shall be glad to receive article).—E. C. G. (we are not able to look back).—N. W. (Mr. Robert Stephenson was the engineer. Letter as to Letter Boxes declined).—R. E. P.—R. M. F.—R. R.—D.—J. H.—G. T. C.—H. H.—J. F.—S. B.—C. H.—H. S.—C. B. A.—J. L.—J. H.—R. C.—E. R.—F. H.—R. M. F.—A. W.—W. P. M.—Artisans' Dwelling Society.—J. H.—J. R.—S. & L.—J. & H.—Prof. H. L.—S. V. M.—F. H.—E. A. L.—G. T.—R. J. C.—R. M. B. (next week).—S. O. (next week).—F. N. (next week).—E. E. S. E. (next week).

We are compelled to decline pointing out books and giving addresses.

All statements of facts, list of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

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